Western Climate Initiative

Design Recommendations for the WCI Regional Cap-and-Trade Program

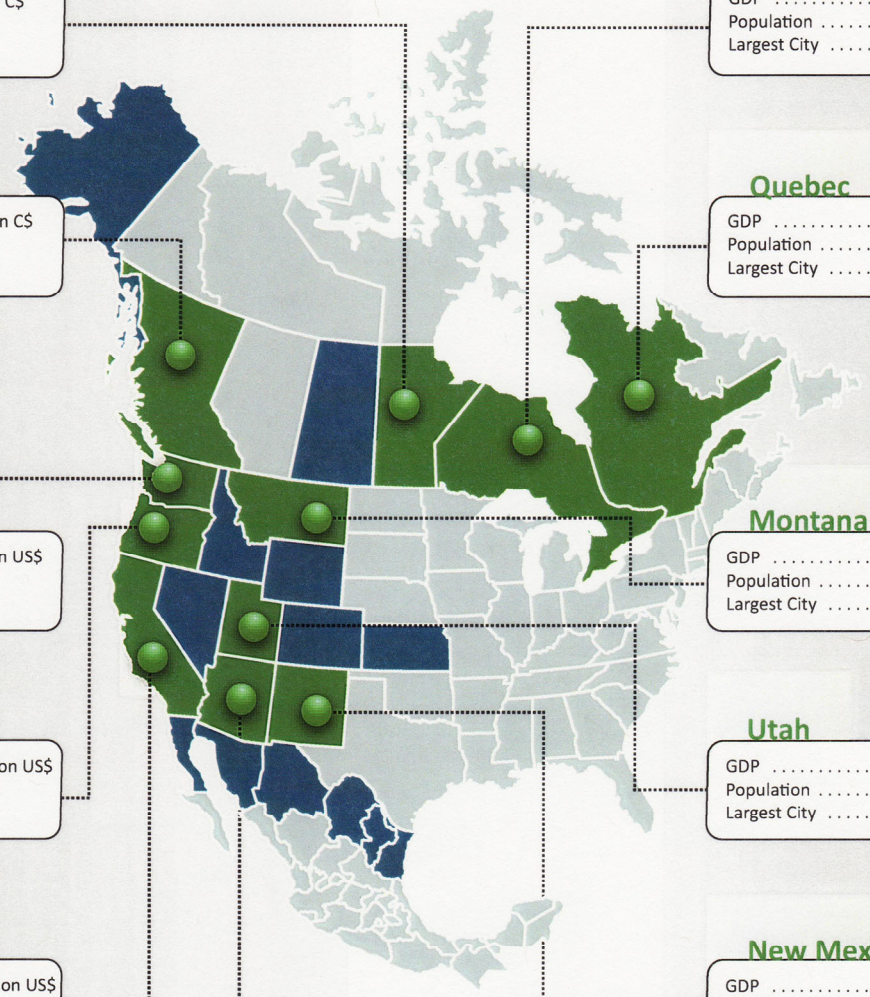
September 23, 2008
Corrected March 13, 2009

Arizona | British Columbia | California

Manitoba | Montana | New Mexico | Ontario

Oregon | Quebec | Utah | Washington

Western Climate Initiative



Manitoba

GDP ..... 48,586 Million C$
Population 1,186,700
Largest City..... Winnipeg

Ontario

GDP ..... 582,019 Million C$
Population 12,803,900
Largest City ..... Toronto

British Columbia

GDP ..... 190,214 Million C$
Population 4,380,300
Largest City ..... Vancouver

Quebec

GDP ..... 298,157 Million C$
Population 7,700,800
Largest City ..... Montreal

Washington

GDP ..... 311,270 Million US$
Population 6,468,424
Largest City ..... Seattle

Montana

GDP ..... 34,253 Million US$
Population 957,861
Largest City ..... Billings

Oregon

GDP ..... 158,233 Million US$
Population 3,747,455
Largest City ..... Portland

Utah

GDP ..... 105,658 Million US$
Population 2,645,330
Largest City ..... Salt Lake City

California

GDP ..... 1,812,968 Million US$
Population 36,553,215
Largest City ..... Los Angeles

New Mexico

GDP ..... 76,178 Million US$
Population 1,969,915
Largest City ..... Albuquerque

Arizona

GDP ..... 247,028 Million US$
Population 6,338,755
Largest City ..... Phoenix

Partners Observers

WCI OBSERVERS

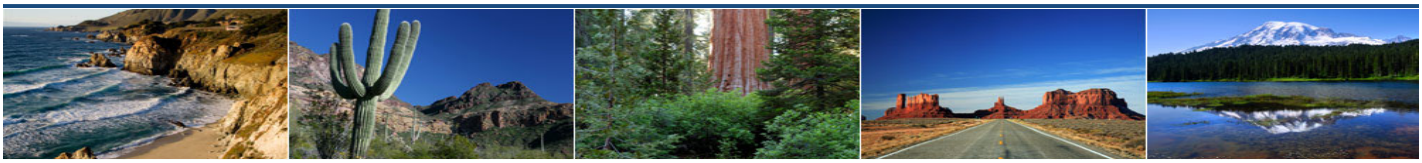
CANADA
Saskatchewan

UNITED STATES
Alaska
Colorado
Idaho
Kansas
Nevada
Wyoming

MEXICO
Baja California
Chihuahua
Coahuila
Nuevo Leon
Sonora
Tamaulipas

All figures for 2007
Source for US data: US Census Bureau and US Bureau of Economic Analysis
Source for Canadian data: Statistics Canada

Western Climate Initiative



September 23, 2008

To All Interested Parties:

In February 2007, the governors of Arizona, California, New Mexico, Oregon and Washington kicked off this ambitious effort to design a regional, market-based approach for reducing greenhouse gas emissions. Since that time, the governors of Montana and Utah and the premiers of British Columbia, Manitoba, Ontario, and Quebec have joined in this historic effort and today we are pleased to release our "Design Recommendations for the WCI Regional Cap-and-Trade Program."

Each of our states and provinces recognizes the need to take action now to address the threats posed by global climate change. The design recommendations being released today are an important milestone in our collective effort to respond to the leadership role states and provinces have established on this issue.

While we are pleased to reach this milestone, we recognize that much more remains to be done to move from program design to program implementation. Over the next couple of months, we will prepare a detailed work plan to guide the next phase of the Western Climate Initiative. The work plan will identify the priorities for the coming year and will provide information on how all interested parties can continue to engage in our process.

As we developed these recommendations over the last 18 months, we benefited greatly from the input provided by a wide variety of stakeholders representing business, industry, labor, and environmental groups. The dedication of our state and provincial staff and the assistance of our technical and policy advisors were also critical to our success.

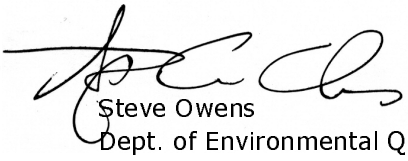
On behalf of the governors and premiers of the Western Climate Initiative, we again thank you for your interest in our work and for your many contributions to date. We look forward to working with you as we move into the next phase of this initiative. We know that together we can meet the challenge of climate change while enhancing overall environmental health and economic vitality throughout the region.

Sincerely,

The WCI Partners

State of Arizona

Lori Faeth
Office of the Governor



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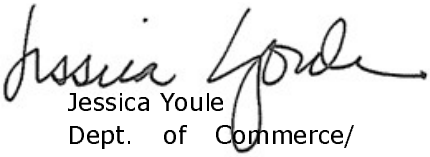

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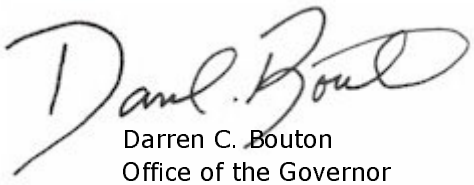

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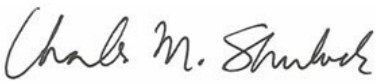

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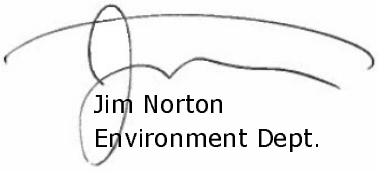

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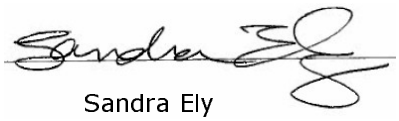

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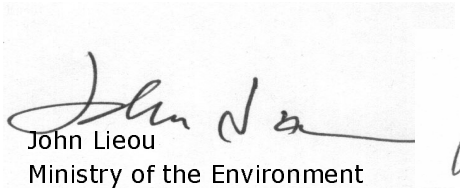

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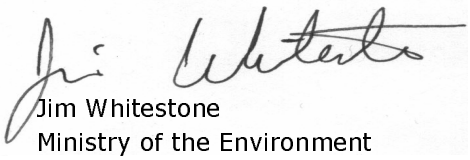

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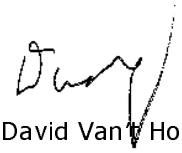

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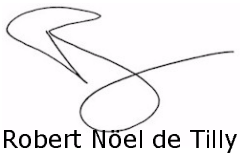

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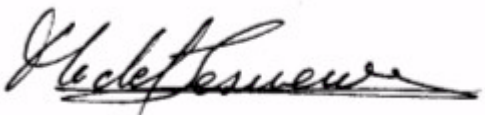

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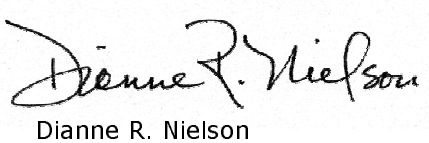

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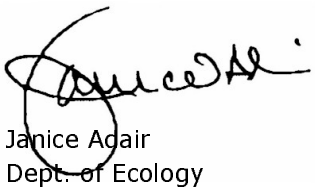

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Acknowledgements

Those of us who were honored to represent our states and provinces in designing the WCI cap-and-trade program owe a debt of gratitude to the advisors who helped us throughout the process: Franz Litz, Nicholas Bianco, and Jonathan Pershing of the World Resources Institute, Judi Greenwald, Anna Motschenbacher, Joshua Bushinsky, and Steve Caldwell with the Pew Center on Global Climate Change, Tom Peterson, Jeff Wennberg, Ken Colburn, and June Taylor with the Center for Climate Strategies, and Michael Lazarus with the Stockholm Environment Institute.

Sam Hitz, Tymon Lodder, Jill Gravender and Executive Director Diane Wittenberg from The Climate Registry and Paula Fields with ERG were instrumental in helping develop the essential elements for reporting.

Jill Duggan who heads the United Kingdom's International Emissions Trading office and her colleague, Tim McRae, shared expertise and experiences with the design and implementation of the EU ETS. Similarly, Mr. Litz and Mr. Wennberg worked for New York and Vermont respectively during the design of the Regional Greenhouse Gas Initiative (RGGI) and helped us build upon that experience.

Rob Greenwood and Bill Ross of Ross and Associates provided exceptional facilitation services during the last several negotiating sessions of the WCI, helping us get to success. Lydia Dobrovolny, also with Ross and Associates, provided critical support during the final negotiating sessions.

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Tim Smith with Waggener Edstrom Worldwide developed our communication tools with amazing speed. Deb Kinsley with the Western Governors' Association provided unparalleled service in making all of the arrangements for our Partner meetings and stakeholder workshops. We want to also thank Marcus Schneider and his colleagues at the Energy Foundation who provided the seed money to get this effort underway.

Our biggest thanks go to Pat Cummins with the Western Governors' Association. As our project manager, he kept us on track, on course and within budget. We simply would not have gotten through the process without Pat's assistance and support.

Table of Contents

Section 1: Design Recommendations for the WCI Regional Cap-and-Trade Program

The Western Climate Initiative (WCI) jurisdictions are recommending a design for a broad cap-and-trade program as part of a comprehensive regional effort to reduce emissions of global warming pollution to achieve the WCI 2020 regional goal. The recommended design will provide opportunities to obtain low-cost emission reductions through emission trading, allowance banking, and inclusion of an offsets component. The design is also intended to mitigate economic impacts, including impacts on consumers, income, and employment. The design balances all principles adopted by the WCI Partner jurisdictions to maximize total benefits throughout the region, including reducing air pollutants, diversifying energy sources, and advancing economic, environmental, and public health objectives, while also avoiding localized or disproportionate environmental or economic impacts. Finally, the WCI Partner jurisdictions have designed a program that can stand alone, provide a model for, be integrated into, or be implemented in conjunction with programs that might ultimately emerge from the federal governments of the United States and Canada.

1. Scope[1]

1.1. Greenhouse gases (GHGs) covered: Carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

1.2. Emissions covered:

1.2.1. Electricity generation, including emissions from electricity generated outside the WCI jurisdictions (or generated by a federal entity or on tribal lands) that is delivered into a WCI Partner jurisdiction for consumption in that WCI Partner jurisdiction;

1.2.2. Combustion at industrial and commercial facilities;

1.2.3. Industrial process emission sources[2], including oil and gas process emissions;

1.2.4. Residential, commercial, and industrial fuel combustion at facilities with emissions below the WCI thresholds3 (as described below in the Point of Regulation section, these emissions will be covered upstream). Coverage of these emissions will begin at the start of the second compliance period;

[1] The *scope* defines the GHG emissions that are included in the cap-and-trade program, including the emission sources and GHG emissions that fall under the cap.

[2] As used here, process emissions include emissions from chemical, biological, and other non-combustion processes. These emissions may be deliberate (e.g., vented), fugitive (e.g., leaked), or accidental.

[3] *Thresholds* are emission levels that determine when a particular entity or facility will have a compliance obligation under the cap-and-trade program.

1.2.5. Transportation fuel combustion (as described below in the Point of Regulation section, these emissions will be covered upstream.) Coverage of these emissions will begin at the start of the second compliance period.

1.2.6. The WCI Partner jurisdictions recommend covering combustion from transportation, residential, commercial, and industrial (including electricity) fuel sources with the expectation that the individual WCI Partner jurisdictions will:

- Mitigate the economic impact on consumers;
- Implement other policies that will reduce GHG emissions from the transportation sector and reduce demand for transportation fuels (such as vehicle standards, smart growth, low carbon fuel standards, transit options, etc.); and
- Address any issues associated with the point of regulation and its implementation.

1.3. For biomass determined by each WCI Partner jurisdiction to be carbon neutral, the carbon dioxide emissions from the combustion of that biomass are not included in the cap-and-trade program, except for purposes of reporting.

1.4. Carbon dioxide emissions from the combustion of pure biofuels, or the proportion of carbon dioxide emissions from the combustion of biofuel in a blended fuel (e.g., B20 or E85), are not included in the cap-and-trade program, except for purposes of reporting.

1.5. Prior to program start, the WCI Partner jurisdictions will assess whether and how to include upstream emissions from biofuel and fossil fuel production, taking into consideration the potential for emissions leakage, the potential role of other policies (such as a low carbon fuel standard), consistent treatment among fuels, and other factors (such as practicality of implementation).

1.6. As described in Section 5, Role of Other Policies, WCI Partner jurisdictions acknowledge that individual jurisdictions may utilize other fiscal measures such as British Columbia's carbon tax, to address transportation fuels and fuel use by residential and commercial sources that contribute to achieving overall comparable GHG emission reductions and internalize the price of carbon as expected through the regional cap-and-trade program.

1.7. Adequate quantification methods will be established for emissions sources prior to including them in the program.

2. Point of Regulation[4]

2.1. Industrial sources (both process and combustion) with emissions above the threshold: The point of regulation will be at the point of emission.

2.2. Electricity: The point of regulation is the First Jurisdictional Deliverer (FJD). For sources within WCI jurisdictions, the FJD is the generator. For power that is generated outside the WCI jurisdictions (or generated by a federal entity or on tribal lands) for consumption within a WCI Partner jurisdiction, the FJD is the first entity that delivers that electricity over which the consuming WCI partner jurisdiction has regulatory authority.

2.3. Residential, commercial, and industrial fuel combustion at facilities with emissions below the threshold: The point of regulation will be where the fuels enter commerce in the WCI Partner jurisdictions, generally at a distributor. The precise point is to be determined and may vary by jurisdiction.

2.4. Transportation fuel combustion: The point of regulation will be where the fuels enter commerce in the WCI Partner jurisdictions, which for liquid fuels is generally at the terminal rack, final blender, or distributor. The precise point is to be determined and may vary by jurisdiction.

3. Thresholds for Coverage Under the Cap-and-Trade Program

3.1. Emission threshold: 25,000 metric tons of carbon dioxide equivalents (CO_2e) annually defines the entities or facilities (e.g., First Jurisdictional Deliverer, fuel distributor, fuel blender) that will have a regulatory compliance obligation under the cap-and-trade program. Mandatory reporting data may be used to adjust this threshold for specific industries where necessary. Additional analyses will be performed to determine if adjustments to the threshold are needed to ensure sufficient coverage or to address competitiveness issues within individual sectors prior to the beginning of the program (e.g., because different WCI Partner jurisdictions may have the same industry but with different sized sources).

3.2. A method will be developed to prevent entities or facilities from avoiding coverage, such as by breaking themselves into separate power deliverers that each deliver electricity with emissions below the threshold.

4. Program Expansion

4.1. Future Program Expansion: The scope of the cap-and-trade program is capable of expanding over time (including possibly adjusting applicability thresholds). Prior to each compliance period, the WCI Partner jurisdictions will review whether to bring new sources into the program and, if so, which ones.

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[4] The *point of regulation* is the entity or facility with the compliance obligation, i.e., the requirement to surrender sufficient GHG allowances to cover actual emissions during the compliance period. An *allowance* is the tradable permit to emit one metric ton of GHG emissions in CO_2e. The term *entity* is generally used when the point of regulation is upstream of the point of emissions, to describe a company that has an obligation to surrender allowances to cover the carbon content of the fuel the company is moving through commerce, or when the point of regulation is at the First Jurisdictional Deliverer, to describe a company that has an obligation to surrender allowances to cover the emissions attributable to the generation of power the company is importing. When the point of regulation is at the point where the emissions occur, the term *facility* is generally used. The term *source* is used to refer to emissions from either a facility or an entity.

5. Role Of Other Policies[5]

5.1. The role of other GHG-reducing policies is to help the WCI Partner jurisdictions achieve their 2020 reduction goal and provide other benefits. Those policies will work in concert with the cap-and-trade program and may apply to any source of GHG emissions.

5.2. Carbon Tax and Other Fiscal Measures:

5.2.1. The WCI Partner jurisdictions agree that individual jurisdictions may use fiscal measures that contribute to achieving overall comparable GHG emission reductions and internalize the price of carbon as expected through the regional cap-and-trade program for transportation and residential/commercial fuels.

5.2.2. British Columbia currently has a carbon tax. By 2012, the WCI Partner jurisdictions will determine the mechanism for integrating the cap-and-trade program with the BC carbon tax.

6. Setting the Regional Cap[6]

6.1. The aggregate regional cap for the cap-and-trade program will:

6.1.1. Equal the sum of the WCI Partner jurisdictions allowance budgets (as referenced in Section 7.1).

6.1.2. Include annual caps (with 3-year compliance periods7) from the beginning of the program in 2012 through 2020. The annual caps will be set in advance of the program start in 2012 so that the total number of allowances issued in each 3-year compliance period through 2020 is known.

6.1.3. Decline over time. The regional cap trajectory for covered sectors will be a straight line from the year of initial coverage (2012 for some sources and 2015 for other sources) to 2020.

6.2. 2012: The initial regional cap will be set at the best estimate of expected actual emissions for those sources covered in the initial year of the program (i.e., 2012) as calculated through the Partner allowance budgets as described in 7.2.

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[5] *Other policies* include complementary policies and alternative policies. A *complementary policy* is used in this context to mean policies other than a cap-and-trade program that aid in the goal of achieving emissions reductions for capped or uncapped sources. *An alternative policy* is a policy that is employed in lieu of a cap-and-trade program to achieve emissions reductions for one or more sources.

[6] The *regional cap* is the overall limit on total emissions set for the total emissions included in the cap-and-trade program.

[7] The 3-year compliance periods are 2012-2014, 2015-2017, and 2018-2020.

6.3. 2015: The regional cap in 2015 will be set by adding the best estimate of expected actual emissions in 2015 from transportation fuels and residential, commercial, and industrial fuels (and any other sectors or sources that may be added to the program for the first time in 2015) to the emissions trajectory for the sources first included in the program in 2012.

6.4. 2020: The regional cap for 2020 will be set so that reductions achieved by the cap plus reductions from other GHG reduction policies for uncapped sources will achieve the WCI regional 2020 goal.

6.5. Post-2020 caps: The WCI Partner jurisdictions will set these regional caps not less than three years in advance.

6.6. Once established, the regional cap for each compliance period will not be adjusted except as necessary to account for:

- Changes in WCI membership;
- Changes in scope or thresholds; or
- Data found to be incorrect or inaccurate that was used to determine the cap, which may become apparent, for example, after the start of mandatory reporting.

Any adjustments will be made prior to the beginning of the compliance period.

7. Apportionment[8]

7.1. Each WCI Partner jurisdiction will have an annual allowance budget within the declining regional cap from 2012 to 2020. The annual WCI Partner jurisdiction allowance budget for each year through 2020 will be set prior to the start of the program in 2012.

Each WCI Partner jurisdiction's 2020 allowance budget will be derived from its individual WCI Partner jurisdiction goal[9] used for purposes of the program, accounting for other policies described in Section 5.[10]

There are instances in which electricity is generated in one WCI Partner jurisdiction, but consumed in another WCI Partner's jurisdiction, giving rise to the possibility of double-counting emissions. WCI Partner jurisdictions in such situations will agree to an equitable solution in the context of the WCI cap-and-trade program design.

7.2. For 2012, each WCI Partner jurisdiction's allowance budget will be based on the best estimate of expected emissions for sources covered in the cap-and-trade program in the WCI Partner jurisdiction in 2012. The estimate of expected actual emissions in 2012 will be developed using the best available data (including any available mandatory reporting data) and by accounting for expected changes in emissions in 2012. Population growth, economic growth,

[8] *Allowance apportionment* describes the Partners' budget or share of WCI region-wide GHG emission allowances. Allowance budgets must be set for each Partner jurisdiction.

[9] Partner goals are those reduction goals or limits that have been established by each individual WCI Partner jurisdiction.

[10] By the end of 2009, Oregon will determine its cap-and-trade specific Partner goal at a level which is at least as stringent as the WCI regional goal.

voluntary and mandatory emission reductions, and other factors will be considered in making the estimate. Each WCI Partner jurisdiction's allowance budget will be adjusted to account for the production and consumption of electricity megawatt hours within each WCI Partner jurisdiction, population growth, and the share of total WCI Partner jurisdictions emissions in 2001 through 2005. Each WCI Partner jurisdiction will make a one-time contribution of 1% of their 2012 budget to be allocated to make these adjustments.

7.2.1. For 2015, each WCI Partner jurisdiction's allowance budget will be set by adding the best estimate of expected actual emissions in 2015 from transportation fuels and residential, commercial, and industrial fuels (and any other sectors or sources that may be added to the program for the first time in 2015) to the emissions trajectory for the sources first included in the program in 2012. The estimate of expected actual emissions in 2015 will be developed using the best available data (including any available mandatory reporting data) and by accounting for expected changes in emissions in 2015 for the sources added to the cap in 2015. Population growth, economic growth, voluntary and mandatory emissions reductions, and other factors will be considered in making the estimate.

7.2.2. From 2015-2020, the trajectory for each WCI Partner jurisdiction's annual allowance budget for covered sectors will be a straight line from the year of initial coverage (2012 for some sources and 2015 for other sources) to 2020.

7.3. For years post-2020, the WCI Partner jurisdictions will set allowance budgets not less than three years in advance.

7.4. Once established, each WCI Partner jurisdiction's allowance budget will not be adjusted except as necessary to account for:

- Changes in WCI membership;
- Changes in scope or thresholds; or
- Data found to be incorrect or inaccurate that were used to determine the cap or the WCI Partner jurisdiction allowance budgets, which may become apparent, for example, after the start of mandatory reporting.

Such adjustments will take effect at a regionally coordinated and designated time, such as at the beginning of a compliance period.

7.5. WCI Partner jurisdictions will recognize within their own jurisdictions allowances issued by other WCI Partner jurisdictions so that all WCI allowances are of equivalent use and fungible throughout the WCI region, regardless of which WCI Partner jurisdiction issues the allowances.

8. Distribution of Allowances[11]

8.1. Distribution of Allowances by WCI Partner jurisdictions: Once the allowance budget has been established for each WCI Partner jurisdiction, allowances will be issued by each WCI Partner within its own jurisdiction. Each allowance will be equal to one metric ton of carbon dioxide equivalent.

8.2. The WCI Partner jurisdictions agree that a portion of the value represented by each WCI Partner jurisdiction's allowance budget (for example, through set-asides of allowances, a distribution of revenues from the auctioning of allowances, or other means) will be dedicated to one or more of the following public purposes which are expected to provide benefits region wide:[12]

- Energy efficiency and renewable energy incentives and achievement;
- Research, development, demonstrations, and deployment (RDD&D) with particular reference to carbon capture & sequestration (CCS); renewable energy generation, transmission and storage; and energy efficiency;
- Promoting emission reductions and sequestration in agriculture, forestry and other uncapped sources; and
- Human and natural community adaptation to climate change impacts.

8.3. The remaining portion of the value represented by each WCI Partner jurisdiction's allowance budgets will be used as that jurisdiction sees fit. WCI Partner jurisdictions may consider objectives such as:

- Reducing consumer impacts, especially for low-income consumers;
- Providing for worker transition and green jobs;
- Achieving emission reductions in communities that experience disproportionate environmental impacts;
- Supporting community-wide efforts funded by local governments to reduce GHG emissions;
- Providing transition assistance to industries;
- Recognizing early actions to reduce emissions; and/or
- Promoting economic efficiency.

8.4. In advance of the first compliance period, and at least one year before the beginning of each relevant compliance period thereafter, each WCI Partner jurisdiction will advise the other WCI Partner jurisdictions how it intends to distribute or retire allowances so that all WCI Partner jurisdictions' plans can be made public in a coordinated fashion.

8.5. If analysis demonstrates that allocations to a particular sector should be treated uniformly by some WCI Partner jurisdictions in order to address competition among like facilities or entities within that sector, and if from that analysis some WCI Partner jurisdictions determine that it is necessary to address those competitiveness issues between the WCI Partner jurisdictions where the facilities or entities operate, those WCI Partner jurisdictions will

[11] *Allowance distribution* is the Partners' initial distribution of GHG emission allowances into the market.

[12] This will recognize pre-existing commitments to action and legislative requirements on use of revenue (e.g., through BC's Climate Action Plan and Carbon Tax).

standardize the distribution of allowances as necessary to address competitive impacts sufficiently, in advance of the first compliance period.

- Potential sectors where analysis to consider similar treatment is appropriate include those with process (non-combustion) emissions where the greatest emission reduction potential is associated with large technology changes and high GHG emission intensity, such as aluminum, steel, cement, lime, pulp and paper, and oil refining.
- Some WCI Partner jurisdictions may also decide that based on analysis of competitive factors in the electricity sector, distribution of allowance value or auction revenues in that sector should be standardized between those WCI Partner jurisdictions where competitive issues are recognized.

8.6. A WCI Partner jurisdiction will allocate or retire all the allowances in its allowance budget by the end of the applicable compliance period. Except as provided in Section 8.10, a WCI Partner jurisdiction will not hold allowances beyond the end of the compliance period.

8.7. Recognizing the WCI Partner jurisdictions objective of standardizing treatment of some sectors, and acknowledging the differences in the appropriate use of auctions by sector:

8.7.1. Consistent with applicable state and provincial law, the WCI Partner jurisdictions will auction a minimum of 10% of the allowance budget in the first compliance period beginning in 2012. This minimum percentage will increase to 25% in 2020. The WCI Partner jurisdictions aspire to a higher auction percentage over time, possibly to 100%.

8.7.2. Each WCI Partner jurisdiction has discretion to auction a greater portion of its allowance budget as it sees fit.

8.7.3. If a WCI Partner jurisdiction cannot auction allowances, that Partner jurisdiction will notify the other WCI Partner jurisdictions at least six months before the beginning of auctions scheduled for each compliance period. The fact that a WCI Partner jurisdiction cannot auction allowances shall not preclude the other Partner jurisdictions from doing so.

8.8. To the extent WCI Partner jurisdictions auction allowances, those jurisdictions will undertake auctions through a coordinated regional auction process by which each participating WCI Partner jurisdiction will auction allowances throughout the WCI region and receive their proceeds from the auction.

8.9. By the end of 2009 the WCI Partner jurisdictions will develop a design for the coordinated regional auction process. The WCI Partner jurisdictions will design the auction process to consider and prevent market manipulation.

8.10. To manage the risk of inadvertently setting the program cap higher than intended relative to emissions covered by the program, a reserve or minimum price will be established for a portion of the auctioned allowances. Consistent with applicable state and provincial law, this portion will equal 5% of allowances issued by any WCI Partner jurisdiction. If any of these allowances

when offered at auction are not purchased at or above the reserve or minimum price, a fraction of the unsold ones will be retired. The unsold allowances that are not retired may be auctioned in later compliance periods or retained by the individual WCI Partner jurisdictions for use as each sees fit in later compliance periods, as determined in advance by the WCI Partner jurisdictions. Any WCI Partner jurisdiction that does not participate fully in the auction with the reserve or minimum price will retire the same proportion of its allowance budget as those retired by the WCI Partner jurisdictions that participated in the auction. The percentage of the allowance budgets, the reserve price, the fraction of unsold allowances that will be retired, and the fraction of unsold allowances that will be retained by the individual WCI Partner jurisdictions will be determined as part of the auction design.

8.11. Early Reduction Allowances. The program will encourage entities and facilities included under the cap to reduce GHG emissions before the start of the first compliance period in 2012.

8.11.1. Each WCI Partner jurisdiction may issue Early Reduction Allowances for certain emissions reductions at covered entities and facilities within its jurisdiction that are achieved after January 1, 2008 and before January 1, 2012.

8.11.2. By the end of 2009, the WCI Partner jurisdictions will jointly establish criteria to determine which early reductions will be eligible for Early Reduction Allowances. The criteria will ensure that the reductions are voluntary, additional, real, verifiable, permanent and enforceable.

8.11.3. Each WCI Partner jurisdiction that issues Early Reduction Allowances will do so in 2012. Any Early Reduction Allowances issued will be in addition to each WCI Partner jurisdiction's 2012 allowance budget.

8.11.4. These allowances shall be treated like other allowances in the cap-and-trade program.

8.12. Other Early Actions and Set-Asides: Each WCI Partner jurisdiction has discretion to recognize early actions other than those under Section 8.11, or otherwise set-aside allowances for distribution. Recognition for early action or set-asides under this subsection will come from within the cap and will come out of the individual WCI Partner jurisdiction's allowance budget.

8.13. Banking: Purchasers and covered entities or facilities, and parties who otherwise obtain allowances, will be allowed to bank allowances without limitation, except to the extent that restrictions on the number of allowances any one party may hold are necessary to prevent market manipulation.

8.14. Borrowing: Borrowing of allowances from future compliance periods will not be allowed.

8.15. Compliance Periods: Each compliance period will be three years long.

9. Offsets,[13] and Allowances From Other Systems

9.1. The WCI Partner jurisdictions will include a rigorous offsets system. The primary role of the offsets system is to reduce the compliance costs for the cap-and-trade program, while ensuring the environmental integrity of the cap.

9.2. The WCI Partner jurisdictions will limit the use of all offsets, and allowances from other GHG emission trading systems that are recognized by the WCI Partner jurisdictions, to no more than 49% of the total emission reductions from 2012-2020 in order to ensure that a majority of emission reductions occur at WCI covered entities and facilities. Each WCI Partner jurisdiction will have the discretion to set a lower percentage limit. All offsets and non-WCI allowances must meet the rigorous criteria established by the WCI Partner jurisdictions.

The WCI Partner jurisdictions will establish criteria to ensure that all offset projects used to meet a compliance obligation result in a GHG reduction, removal or avoidance that is real, surplus/additional, verifiable and permanent or that meets a comparably rigorous standard as described in Section 9.7 below. Offset projects must also be enforceable by the individual WCI Partner jurisdiction that is issuing the credit and the credit must be verifiable by the individual WCI Partner jurisdiction that is accepting it. The criteria will ensure that the quantification of the GHG reduction, removal, or avoidance is accurate and not double counted. The standards and processes for approving offset projects will be developed and implemented in an open and transparent manner that will be well-defined in advance of the start of the cap-and-trade program.

9.3. The WCI Partner jurisdictions encourage the development of offset–projects located inside WCI jurisdictions for compliance purposes in the WCI cap-and-trade regulatory program in order to capture collateral benefits associated with some offsets projects, such as health, social, and environmental benefits.

9.4. The WCI Partner jurisdictions have identified the following list of project types as a priority for investigation and development to participate in the offset system. Making these project types a priority means the WCI Partner jurisdictions are interested in understanding if they are suitable for the offset system, if they will meet the criteria for environmental integrity, and if adequate protocols/methodologies for their quantification and monitoring can be adapted or developed. Priority does not mean these project types are guaranteed to be in an offset system. Project types that reduce emissions that would eventually be covered by the cap-and-trade system would only be eligible until that coverage begins. Project types that reduce emissions covered by the cap-and-trade system would not be eligible to create offsets because the result would be a double counting of the emission reduction. The list is in alphabetical order and does not directly or indirectly represent a ranking or order of preference:

[13] *Offsets* are emission reduction projects undertaken to address emissions not included in a cap-and-trade program. An offset mechanism enables covered entities to offset their own emissions by purchasing emission reduction credits generated through projects that address emissions not covered by the cap.

- Agriculture (soil sequestration and manure management);
- Forestry (afforestation/reforestation, forest management, forest preservation/conservation, forest products); and
- Waste management (landfill gas and wastewater management).

9.5. Starting in 2009, the WCI Partner jurisdictions will coordinate to review, develop, and approve, as appropriate, protocols for the project types that meet the necessary criteria for inclusion. The WCI Partner jurisdictions will use offset protocols that are standardized to the extent possible and make use of (or adapt if needed), existing protocols as appropriate. The WCI Partner jurisdictions will also initiate the establishment of a process during 2009 to coordinate the review and approval of other project types and protocols proposed by project developers. The WCI Partner jurisdictions will establish rigorous criteria for inclusion of offsets in the WCI program.

9.6. WCI Partner jurisdictions will recognize offsets meeting the WCI criteria within their own jurisdictions regardless of which WCI Partner jurisdiction issued them, so that all WCI offsets are of equivalent use and fungible throughout the WCI region. Offsets not meeting the WCI criteria will not be accepted for compliance purposes.

9.7. WCI Partner jurisdictions may approve and certify offset projects located throughout the United States, Canada, and Mexico where such projects are subject to comparably rigorous oversight, validation, verification, and enforcement as those located within the WCI jurisdictions. WCI Partner jurisdictions will not approve offset credits for GHG reductions in developed countries (Annex 1 countries in UN Framework Convention on Climate Change) for projects that reduce, remove, or avoid emissions from sources that within WCI Partner jurisdictions are covered by the cap-and-trade program.

9.8. The WCI Partner jurisdictions may accept offset credits from developing countries through the Clean Development Mechanism (CDM) of the Kyoto protocol, and the WCI Partner jurisdictions may establish added criteria to ensure similar rigor to WCI approved/certified offset projects or other requirements, such as international offset standards, as appropriate to enable use of these offset credits in the cap-and-trade program.

9.9. The offset protocols used by the WCI Partner jurisdictions will meet rigorous criteria to preserve the environmental integrity of the overall cap-and-trade program.

9.10. WCI Partner jurisdictions do not intend to regulate or restrict the existing voluntary market in offsets, to restrict the sale of offsets from projects located within a WCI Partner jurisdiction, or to place restrictions on ownership of offsets projects located within WCI Partner jurisdictions.

10. Reporting

10.1. Mandatory measurement and monitoring for the six included GHG emissions will commence in January 2010 for all entities and facilities subject to reporting. Reporting of 2010 emissions will begin in early 2011.

10.2. The entities and facilities subject to reporting are those with annual emissions equal to or greater than 10,000 metric tons of CO_2e. Where fuel combustion emissions are covered upstream (e.g., emissions from transportation fuel combustion and emissions from fuel combustion at residential, commercial, and industrial facilities with emissions below the threshold) the reporting threshold will apply to entities (e.g., fuel distributors and blenders) based on the expected combustion emissions from the fuels distributed. In some limited instances the threshold may be based on other parameters, such as throughput or capacity, as long as these thresholds represent the equivalent of, or are lower than, the 10,000-metric-ton threshold..

10.3. WCI Partner jurisdictions will require third party verification of reported emissions from entities and facilities that will be included under the cap.

10.4. Prior to the start of the mandatory reporting program, the WCI Partner jurisdictions will establish the essential requirements for reporting by all entities and facilities required to report in each of the WCI Partner jurisdictions.

10.5. As each WCI Partner jurisdiction collects additional emissions data from entities and facilities required to report, data will be made available to all WCI Partner jurisdictions for review and consideration for possible expansion of the cap-and-trade program.

10.6. Nothing in the WCI program design limits the discretion of any WCI Partner jurisdiction to require reporting earlier, at lower thresholds, or for entities and facilities not covered by the cap-and-trade program.

11. Start Date for Cap-and-Trade

11.1. The cap-and-trade program will launch January 1, 2012.

12. Compliance and Enforcement

12.1. Each WCI Partner jurisdiction will retain and/or enhance its regulatory and enforcement authority and responsibilities to enforce compliance with the cap-and-trade program within its own jurisdiction.

12.2. Each covered entity or facility will demonstrate compliance with the cap-and-trade program by surrendering sufficient allowances by July 1 of the year following the end of each compliance period. To ensure transparency and maintain public confidence, certain data from the emissions reports, allowances, and offsets that are used for compliance will be made public in a timely manner.

12.3. If by the deadline for demonstrating compliance a covered entity or facility does not have sufficient allowances to cover its emissions for the previous compliance period, it shall be required to obtain and surrender three allowances for every metric ton of CO_2e not covered by an allowance at the deadline. This does not preclude other penalties allowed under individual state or provincial laws.

12.4. The WCI Partner jurisdictions recognize that during the first compliance period, both they and the entities and facilities covered by the cap-and-trade program will likely encounter issues that arise in the implementation of any new program. Consequently, the WCI Partner jurisdictions are committed to providing appropriate technical and other compliance assistance to the program participants.

12.5. The WCI Partner jurisdictions will ensure accounting systems are in place to prevent using allowances, tradable units, and offsets more than once for compliance.

13. Regional Organization, New WCI Partner Jurisdictions, and Linkage

13.1. To reduce administrative costs and improve program transparency and consistency, a regional administrative organization will be created to:

- Coordinate the regional auction of allowances;
- Track emissions and provide public information on progress towards the WCI regional goal;
- Monitor and report on market activity, including any potential market manipulation;
- Serve as a forum for WCI Partner jurisdictions to update one another on program progress;
- Coordinate review and adoption of protocols for offsets;
- Coordinate review and adoption of updated reporting protocols;
- Coordinate review and issuing of offset credits; and
- Suggest criteria and means to accredit service providers to deliver validation and verification services.

13.2. New WCI Partner jurisdictions will come into the cap-and-trade program at a regionally coordinated and designated time, such as the beginning of the relevant compliance period.

13.3. Before joining, a new WCI Partner jurisdiction must have adopted an economy-wide GHG reduction goal for 2020 that is at least as stringent as the WCI regional goal.

13.4. Determination of allowance budgets for new WCI Partner jurisdictions will take into account the following parameters:

- The WCI regional goal;
- Allowance budgets for existing WCI Partner jurisdictions;
- The share of the new WCI Partner jurisdiction's budget that is already included through the WCI's regional cap-and-trade program provisions covering imported electricity; and
- The new Partner's individual GHG emissions reduction goal.

13.5. The WCI Partner jurisdictions will seek bilateral and multilateral linkages with other government-approved cap-and-trade systems so that those allowances and allowances issued by WCI Partner jurisdictions would be fully fungible. Until such bilateral or multilateral linkages are established, the use of allowances from other cap-and-trade systems will be limited as described in Section 9.2.

14. WCI Design and Possible Federal Programs

14.1. The WCI Partner jurisdictions have designed a program that can stand alone, provide a model for, be integrated into, or be implemented in conjunction with programs that might ultimately emerge from the federal governments of the United States and Canada. The WCI Partner jurisdictions intend to promote and influence federal GHG emission reduction programs that are consistent with WCI cap-and-trade design principles, and ensure those programs translate into absolute GHG reductions. In the event WCI issues allowances before a federal program in Canada or the United States, WCI Partner jurisdictions will work to ensure that those allowances are fully recognized and valued in the operation of a federal program.

14.2. The approach taken by the WCI Partner jurisdictions builds upon the experience gained by the WCI Partner jurisdictions in developing and implementing climate change action plans and other market-based programs to address air quality issues, including the regional haze and acid rain programs in the United States. Continued leadership in developing a regional cap-and-trade program allows the WCI Partner jurisdictions to take important action now and promote and protect the interests of early actors in the design and implementation of future national and international programs. Taking action now to achieve emission reductions will position WCI Partner jurisdictions to be leaders in the carbon constrained future.

Section 2: Background Report on the Design Recommendations for the WCI Regional Cap-and-Trade Program[14]

The Western Climate Initiative (WCI) is a cooperative effort of seven U.S. states and four Canadian provinces (the "Partners") that are collaborating to identify, evaluate, and implement policies to reduce greenhouse gas (GHG) emissions, including the design and implementation of a regional cap-and-trade program.[15] The Initiative began in February 2007 with the governors of Arizona, California, New Mexico, Oregon, and Washington, who have since been joined by the premiers of British Columbia, Manitoba, Ontario, and Quebec, and the governors of Montana and Utah.[16] Participation in the WCI reflects each Partner's strong commitment to identifying, evaluating, and implementing collective and cooperative actions to address climate change. This Background Report accompanies the Design Recommendations for the regional cap-and-trade program.

The WCI cap-and-trade program is the most comprehensive cap-and-trade program designed to date. Nearly 90 percent of the GHG emissions in the states and provinces will be covered by the cap when it is fully implemented in 2015. It will include more sectors and emissions than either the Regional Greenhouse Gas Initiative (RGGI) in the northeastern United States, which covers the electricity sector only, or the European Union's Emissions Trading Scheme (EU ETS), which does not cover transportation or residential and commercial fuel use. Through its broad scope, the WCI program will reduce costs while reducing emissions across the economy. It will also spur growth in new green technologies, help build a strong clean-energy economy, and reduce dependence on foreign oil.

The Partner jurisdictions are motivated by the impacts of climate change already being felt in the region. Observed trends include rising temperatures leading to warmer, earlier springs and more frost-free days; changing precipitation patterns that include both prolonged drought and increased flooding, as well as shifts in springtime precipitation from snow to rain; changes in water availability due to earlier spring snowmelt, changes in available water volume, and increased evaporation from reservoirs; rising sea levels; and a growing number of large wildfires. Additional impacts expected from unabated climate change include more heat waves, shrinking glaciers and reduced snowpack, reduced biodiversity as invasions of non-native species increase and local habitat moves northward and to higher elevations, and reduced air quality due to elevated levels of ozone and

[14] No statement in this document should be taken to contradict the Design Recommendations released concurrently with this Background Report; any perceived conflict should defer to the Design Recommendations.

[15] The complete text of the February 26, 2007 Memorandum of Understanding can be found in Appendix A.

[16] The states of Alaska, Colorado, Idaho, Kansas, Nevada, and Wyoming participate as observers, as do the province of Saskatchewan and the Mexican border states of Baja California, Chihuahua, Coahuila, Nuevo Leon, Sonora, and Tamaulipas.

particulates. These impacts affect a wide range of economic sectors, from electricity generation to public health, from agriculture to tourism. The cost of inaction is enormous.

The analyses conducted on the WCI design suggest that the region can mitigate the costs of reducing emissions and realize a cost savings through increased efficiencies and reduced fuel consumption. These savings come in addition to the benefits the region will accrue from a cleaner environment and the promotion of investment and innovation to accelerate the transition to a green economy. The WCI cap-and-trade program is a winning proposition for Partner jurisdictions.

The initial phase of the WCI cap-and-trade program will be a time of transition during which WCI Partner jurisdictions will manage risks, protect the economy, and see real reductions in greenhouse gas emissions. Action is needed now to reduce greenhouse gas emissions and to adapt to climate change impacts. Working together, the states and provinces in the WCI are leading the way.

1. Public Comments and Discussion of WCI Recommendations

The process that led to the recommended design of the regional cap-and-trade program was careful and deliberative. At each step of design development, the WCI Partners sought extensive stakeholder input, as described in part 3.1.3, which yielded a great volume of comments on the range of issues confronted by participating WCI Partner jurisdictions. The comments submitted to the WCI Partner jurisdictions have been posted on the WCI website.[17] The WCI Partners carefully reviewed and considered stakeholder comments in order to formulate the design recommendations for the cap-and-trade program.

This section elaborates on the key program design recommendations. Each design element is defined and the design recommendation is summarized. Stakeholder input on the design element is reviewed briefly. Finally, the WCI Partners' recommendation is discussed in light of stakeholder input, the balancing required between disparate stakeholder positions, lessons learned from other cap-and-trade programs, economic analyses, and expert opinion. The design recommendations also rely on the design principles adopted by the WCI Partner jurisdictions and the overarching program goal of ensuring that greenhouse gas (GHG) emissions are reduced within the WCI Partner jurisdictions.

In conjunction with the cap-and-trade program, individual WCI Partner jurisdictions will:

- Mitigate economic impacts on consumers;
- Implement other policies that will reduce GHG emissions from the transportation sector and reduce demand for transportation fuels (such as vehicle standards, smart growth, low carbon fuel standards, and transit options); and

[17] www.westernclimateinitiative.org.

- Address jurisdiction-specific issues associated with the point of regulation and its implementation.
- If any of the design elements differ between the Design Recommendations and the following explanatory text, the Design Recommendations take precedence.

1.1. Scope

1.1.1. Definition

The *scope* defines the GHG emissions that are included in the cap-and-trade program, including the sectors, emissions sources, and greenhouse gases that fall under the cap. The cap is the absolute aggregate limit on GHG emissions.

1.1.2. Design Recommendation

The WCI Partner jurisdictions recommend a multi-sector greenhouse gas cap-and-trade program covering emissions of the six major GHGs: carbon dioxide, methane, nitrous oxide, perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and sulfur hexafluoride.[18] In the initial compliance period beginning in 2012, the program will cover emissions from electricity, including imported electricity; industrial combustion at large sources; and industrial process emissions[19] for which adequate quantification methods exist. In the second compliance period, beginning in 2015, the program will expand to cover fuels combusted at industrial, residential, and commercial buildings that are not otherwise covered as emissions sources, as well as transportation fuels. The first compliance period of the program will include about half of the economy-wide emissions in the WCI Partner jurisdictions. Starting with the second compliance period, the program will include about 90 percent of emissions. The program is capable of expanding further over time based on new information.

The carbon dioxide emissions from the combustion of biomass that are determined to be carbon neutral will not be covered by the cap-and-trade program emissions cap. Similarly, the carbon dioxide emissions from the combustion of bio-fuels or the bio-fuel component of blended fuels will not be covered by the program emissions cap. However, carbon dioxide emissions from biomass, bio-fuels, and the bio-fuel component of blended fuels will be subject to the program reporting requirements. The WCI Partner jurisdictions are continuing to assess whether and how to include upstream emissions from bio-fuel and fossil fuel production that do not take place within the WCI Partner jurisdictions.

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[18] The Scope Draft Design Recommendations describes the options considered by the scope subcommittee, the evaluation criteria applied to the options, the data and analytical inputs (including data on emissions, numbers of entities, and potential cost impacts), and the decision process for deciding on the recommendations. Available at www.westernclimateinitiative.org/ewebeditpro/items/O104F16031.PDF.

[19] As used here, process emissions include emissions from chemical, biological, and other non-combustion processes. These emissions may be deliberate (e.g., vented), fugitive (e.g., leaked), or accidental.

Individual jurisdictions may utilize comparable fiscal measures, such as British Columbia's carbon tax, to address transportation fuels and fuel use by residential and commercial sources, and industrial fuels not otherwise covered at the emissions source. Adequate quantification methods will be established for emissions sources before they are included in the program.

1.1.3. Stakeholder Input

Stakeholder comments expressed strong support for the broadest possible coverage of sources and emissions under the cap-and-trade program. Factors identified by stakeholders supporting a broad scope include:

- To provide greater certainty that economy-wide emission reductions will be achieved;
- To reduce compliance costs by covering a broad set of emissions sources with diverse emission reduction opportunities;
- To create a level playing field for all fuels;
- To ensure that carbon is priced throughout the economy; and
- To create a more robust GHG trading market.

Many stakeholders stressed the importance of having reliable measurement, monitoring, and reporting protocols in place in order to include an emissions source in the program. For example, stakeholders from the waste management industry highlighted their view that the quantification protocols for landfill methane emissions cannot currently calculate methane emissions at individual landfills with adequate precision for a cap-and-trade program.

Considerable input was received on whether to include transportation fuels in the cap-and-trade program. Many stakeholders supported including transportation fuels in the program, emphasizing that these fuels are the largest source of GHG emissions across the WCI Partner jurisdictions and for most of the individual jurisdictions. They argued that these fuels need to be included to ensure that the economy-wide emission reduction goals can be achieved. Some stakeholders pointed out that if transportation fuels were omitted from coverage, then they would enjoy a competitive advantage over electricity as a vehicle fuel, since electricity would be covered by the program. Stakeholders also provided analyses indicating that including transportation fuels will reduce the concentration of the carbon trading market by including significant additional participants. Reduced concentration may help protect against market manipulation and provide for a more robust market.

A small group of stakeholders expressed opposition or hesitation to including transportation fuels citing concerns regarding: economic impacts, particularly on low-income communities; administrative complexity; and the lack of technical options for reducing reliance on fossil-carbon-based fuels. Some stakeholders suggested that the demand for transportation fuels has been shown to be highly inelastic, so that there would be little emission reduction achieved by including the fuels in the program. Other stakeholders cited analyses suggesting that the demand for transportation may be inelastic, but the demand for traditional transportation fuels was or is becoming increasingly elastic.

The timing for including transportation fuels in the program was also the subject of considerable input. Some stakeholders said it was best to include the fuels in the first compliance period, in particular to internalize the price of carbon as soon as possible. Others said that a delay in coverage was warranted to allow the point of regulation to be adequately determined and to enable complementary policies to enhance the availability of options for reducing emissions.

Stakeholders also commented on whether and when residential and commercial fuels should be included in the cap-and-trade program. Some stakeholders expressed concerns regarding economic impacts and administrative complexity. Some commented that direct use of natural gas at a residence or business is a more efficient use of that fuel than using it to generate electricity and, for this reason, should be excluded from coverage in the program. It was also argued that energy efficiency programs would be a more effective method of reducing emissions from these fuels. Others stressed the importance of creating a level playing field across all fuels, indicating that natural gas competes with electricity in residential and commercial applications.

The inclusion of industrial process emissions was also the subject of stakeholder input. Stakeholders pointed out that some process emissions are due to chemical reactions that are fundamental to their production processes. They recommended that these "fixed process emissions" be excluded from the program. Similarly, some stakeholders suggested that the process emissions from geothermal electricity generation should be excluded because geothermal electric generation is a low-emitting process.

Issues were also raised by stakeholders related to incorporating combined heat and power (cogeneration) into the program since it has implications in both the industrial and electricity sectors.

1.2. Discussion of WCI Partners' Recommendation

The WCI Partner jurisdictions have weighed all input carefully and have proposed a program scope that best achieves the program objectives and addresses stakeholder concerns. The WCI Partners are persuaded by the multiple benefits of having as broad a scope as possible, including transportation fuels and fuels for residential, commercial, and small industrial users along with electric sector emissions and industrial emissions. Recognizing that transportation fuels are the largest source of GHG emissions in the region, the WCI Partners have concluded that transportation fuels must be included in order to achieve the objective of reducing emissions not only by 2020, but by 2050. Additionally, the WCI Partners believe that it is important to internalize the cost of carbon throughout the economy and to ensure a level playing field across all fuels. Consequently, the WCI Partners have also concluded that there are important benefits from including transportation fuels and fuels for residential, commercial, and small industrial users.

The timing of the coverage of transportation fuels and fuels for residential, commercial, and small industrial users was considered carefully. While there are benefits of including these fuels starting with the first compliance period, multiple factors necessitated covering them starting in the second compliance period. Electric sector emissions and industrial emissions are traditional emissions sources regulated in the context of clean air regulations. In the WCI Partners' judgment, it is practical to cover these sectors from the start of the program in 2012.

Emissions from fuels for residential, commercial, and small industrial users and transportation fuels are different than those typically dealt with by regulatory agencies under either the U.S. or Canadian Clean Air Acts. The WCI Partner jurisdictions concluded that it is important to have time to develop clear requirements for the entities that will have a regulatory obligation for these emissions, including how to calculate or measure their emissions. In addition, the Partner jurisdictions believe it is important for other policies that will reduce overall consumer demand for these fuels (such as the California clean car standards and strategies to reduce vehicle miles traveled, and to increase the use of low carbon or other "cleaner" fuels) be put in place before these fuels are covered by the cap-and-trade program. The WCI Partner jurisdictions recognize the importance of increased emphasis on energy efficiency to reduce fuel combustion in residential, commercial, and small industrial uses. The WCI Partner jurisdictions also believe it is important to develop strategies to address any potential consumer impacts from covering these emission sources in advance of the second compliance period.

All process emissions with adequate quantification methods will be included in the program. The WCI Partner jurisdictions believe that it is important to incorporate the price of carbon throughout the economy, including in products with fixed process emissions. However, the WCI Partners also recognize that the competitive position of some industrial sources could be affected by this decision. Consequently, the WCI Partners are continuing to evaluate the potential competitive impacts on these sources and will address these impacts if they are found to be significant.

Economic analyses support the recommendation for broad coverage in the cap-and-trade program. The analysis conducted for the WCI Partners is consistent with the body of literature supporting a broad scope, including transportation fuels. In particular, the analysis found that compliance costs can be reduced if the program includes a broad scope.

The WCI Partner jurisdictions recognize the importance of combined heat and power (cogeneration) in the program scope and are continuing to evaluate its implications for the program design.

1.3. Point of Regulation

1.3.1. Definition

The *point of regulation* is the entity or facility with the compliance obligation. The term *entity* is used (a) when the point of regulation is upstream of the point of emissions, to describe a company that has an obligation to surrender allowances to cover the expected emissions from the combustion of the fuel the company is moving through commerce, or (b) when the point of regulation is at the First Jurisdictional Deliverer, to describe a company that has an obligation to surrender allowances to cover the emissions attributable to the generation of power the company is importing. When the point of regulation is at the point where the emissions occur, the term *facility* is generally used. A *compliance obligation* is the requirement to surrender GHG allowances sufficient to cover actual emissions during the compliance period.

1.3.2. Design Recommendation

The WCI Partner jurisdictions are recommending the following points of regulation for the cap-and-trade program:

- For industrial process and combustion sources with emissions above the threshold, the point of regulation is at the facility that has the point of emissions.
- For entities generating and/or delivering electricity with attributed emissions above the threshold, the point of regulation is at the First Jurisdictional Deliverer. This means at the facilities generating power within the WCI Partner jurisdictions and at the first entity over which a Partner has regulatory authority that delivers electricity generated outside the WCI into a WCI Partner jurisdiction for consumption in that Partner jurisdiction.
- For residential, commercial, and industrial fuel combustion at facilities with emissions below the threshold, the point of regulation is where the fuels enter commerce in the WCI Partner jurisdictions, generally at a fuel distributor. The precise point will be determined before the fuels are brought into the program in 2015 and may vary by jurisdiction.
- For transportation fuel combustion, the point of regulation is where the fuels enter commerce in the WCI Partner jurisdictions, generally at the terminal rack, final blender, or distributor. The precise point will be determined before these fuels are brought into the program in 2015 and may vary by jurisdiction.

1.3.3. Stakeholder Input

Stakeholders provided a broad range of comments regarding the preferred points of regulation for the various emissions included in the program. Some stakeholders supported a point of regulation as close to the point of emissions as is practical in order to provide a

regulatory obligation on the actual emitter. Other stakeholders supported an upstream point of regulation, particularly for transportation and other fuels in order to provide as broad coverage as possible.

The WCI Partner jurisdictions received a great variety of comments on the point of regulation for the electricity sector. A majority of commenters favored some approach to cover emissions associated with electricity from outside the WCI Partner jurisdictions. However, there was a wide variety of opinions on how best to cover emissions from imported electricity. A specific challenge relative to covering all deliverers of electricity is the need to track the emissions from the point of generation to the point of delivery inside the WCI Partner jurisdictions. Some commenters observed that, considering this challenge, the WCI Partners should start with a generator-based only point of regulation for electricity, then expand to include power imported for consumption into the WCI Partner jurisdictions once the tracking issue was resolved. Some stakeholders suggested that the tracking issues are complex enough that additional technical assessment is necessary to ensure an adequate approach can be successfully deployed.

1.3.4. Discussion of WCI Partners' Recommendation

In selecting the point of regulation for the different covered sources, the WCI Partner jurisdictions considered the experience of prior cap-and-trade programs, the administrative requirements for the covered facilities and entities, the number of facilities and entities that would be included, and especially given the regional nature of the program, the potential for leakage. For industrial facilities, the point of regulation will be at the facility with the source of the emissions, putting the regulatory obligation at the point of emission. Because there are a very large number of small combustion sources in the transportation, residential and commercial sectors, and at small industrial facilities, the Partner jurisdictions decided it would be impractical to regulate at the point of emissions for these sectors. Rather, the WCI Partners found that these emissions can best be covered upstream at the point of entry of the fuel into the region's economy. By starting the inclusion of these fuels in the second compliance period, the Partners have allowed sufficient time to address issues related to defining the precise upstream point of regulation for these sources.

For electricity, the point of regulation will be at the First Jurisdictional Deliverer. The First Jurisdictional Deliverer is the generator of electricity in a WCI jurisdiction, or the first deliverer of electricity that is generated outside the region to be consumed within a WCI Partner jurisdiction. Emissions associated with power that is wheeled through the WCI Partner jurisdictions but not consumed in any of them is not covered by the program. The Partners recognize that there will be challenges to tracking emissions from the source where electricity is generated to the jurisdiction where it will be consumed. However, the WCI Partners also recognize that a significant amount of electricity consumed in the WCI Partner jurisdictions is generated by federal entities, on tribal land, or in non-WCI jurisdictions. Due to the interconnected nature of the electric grid, leakage of electricity emissions to jurisdictions or entities that are not part of the WCI is a significant concern that the First Jurisdictional Deliverer point of regulation is intended to address. Additionally, the Partners

determined that this point of regulation can best address leakage while maintaining compatibility with wholesale electricity markets.

The recommendation to put the electricity point of regulation at the First Jurisdictional Deliverer represents a WCI innovation to eliminate emissions leakage. Previous programs—such as the Regional Greenhouse Gas Initiative, which follows a pure generator-based approach—have generally failed to address the leakage potential at all. As a new approach, First Jurisdictional Deliverer will pose some new challenges to implement. Given these challenges, work will continue on the First Jurisdictional Deliverer approach, including additional opportunities for stakeholder input during five stakeholder technical working sessions scheduled through the fall and winter of 2008/09. These meetings will provide the WCI Partners, technical experts, and other stakeholders additional opportunities to work together on key issues associated with the implementation of the First Jurisdictional Deliverer approach.

1.4. Thresholds Triggering a Compliance Obligation under the Cap-and-Trade Program

1.4.1. Definition

Thresholds are annual emission levels that are used to determine whether a particular entity or facility will have a compliance obligation under the cap-and-trade program.

1.4.2. Design Recommendation

The cap-and-trade program will apply an emissions threshold of 25,000 metric tons of CO_2e annually to determine the facilities or entities that will have a regulatory compliance obligation under the program.[20] Additional analyses, including data from mandatory reporting, will be performed to determine if adjustments to the threshold are needed to ensure sufficient coverage or to address competitiveness issues within individual sectors prior to the beginning of the program (i.e., because different Partner jurisdictions have the same industry but with different-sized sources). The WCI Partner jurisdictions will develop a method to prevent entities or facilities from avoiding coverage by breaking themselves into smaller units that individually have emission levels that are below the threshold.

1.4.3. Stakeholder Input

Stakeholders provided a broad range of comments regarding how best to apply emission thresholds. The comments were broadly consistent with the goal of covering the vast majority of emissions while reducing administrative burden by minimizing the number of entities and facilities with a direct compliance obligation. Stakeholders differed in their

[20] The Scope Draft Design Recommendations address the question of thresholds and include a section (Section 4.3) on considerations for setting emissions thresholds. Available at http://www.westernclimateinitiative.org/ewebeditpro/items/O104F16031.PDF.

balancing of these objectives, with some recommending lower thresholds, such as 10,000 metric tons of CO_2e annually, and at least one stakeholder recommending 100,000 metric tons annually. Sector-specific thresholds were also discussed, including thresholds defined in terms of production capacity (such as megawatt (MW) capacity for electric power generation) and other units.

Stakeholders also emphasized the importance of defining how the threshold would be applied, including the definition of "facility" or "entity" that would be used. The definition of facility was discussed particularly with reference to oil and gas production fields that may contain equipment dispersed over large areas. Some stakeholders inquired whether the threshold would be applied prospectively (i.e., prior to the start of the compliance period), annually during a compliance period, or after the end of the compliance period.

1.4.4. Discussion of WCI Partners' Recommendation

The WCI Partner considered a broad range of thresholds for the program, with the objective of covering a large portion of emissions (e.g., 90 percent of the emissions in the covered sectors) with as few facilities and entities as possible. The WCI Partner jurisdictions agree with the objective of minimizing the number of facilities and entities with a direct regulatory obligation to minimize the program's administrative burden for both the complying industries and the program administrators. The WCI Partners reviewed available data from several jurisdictions to assess how many facilities and entities would be expected to have compliance obligations and the portion of total emissions covered for a range of threshold values.[21] Based on this review, the WCI Partners concluded that current data support setting an emission threshold of 25,000 metric tons of CO_2e per year and that this threshold would cover more than 90 percent of emissions.

The WCI Partners recognize that additional data will be valuable for assessing the appropriateness of the threshold level. The comprehensive mandatory emissions reporting will provide more complete data, which will be examined to ensure that the threshold is set to achieve the level of program coverage desired. Of note is that by including residential, commercial, and small industrial fuels in the program at an upstream point of regulation, the threshold becomes less important for ensuring coverage of emissions from these fuels: the emissions at facilities below the threshold are covered upstream. Additionally, as discussed above, the WCI Partners will assess whether the threshold creates competitiveness impacts within industries.

[21] For example, The California Air Resources Board found that in California, a threshold of 25,000 metric tons of CO2 covered about 94 percent of emissions from stationary sources. A threshold of 10,000 metric tons of CO2 increased coverage to only 96 percent of emissions, but nearly doubled the number of regulated sources. See the Staff Report: Initial Statement of Reasons for Rulemaking, available online at http://www.arb.ca.gov/regact/2007/ghg2007/isor.pdf.

1.5. Program Expansion

1.5.1. Definition

Program expansion allows the cap-and-trade program to incorporate additional sectors, greenhouse gases, or facilities or entities under the cap, or to include a new Partner in the cap-and-trade-program.

1.5.2. Design Recommendation

The WCI Partner jurisdictions have designed a cap-and-trade program that is capable of expanding over time (including possibly adjusting applicability thresholds over time). Prior to each compliance period, the WCI Partner jurisdictions will review whether to bring new sources into the program, and if so, which ones.

1.5.3. Stakeholder Input

The great majority of stakeholders commenting suggested broad coverage to the extent practicable. Some also expressed a desire to bring all of the states and provinces that are part of the western interconnected electrical grid into the program.

1.5.4. Discussion of WCI Partners' Recommendation

A provision that allows for expansion over time is responsive to public comments calling for broad coverage of the cap-and-trade program. The scope of the program will expand from its initial coverage of industrial combustion and process sources and electricity sources in the first compliance period. In the second compliance period, transportation fuels will be included, along with residential, commercial, and industrial fuels serving facilities not covered by the program in the first compliance period. In addition, the program emissions threshold has been set initially at 25,000 metric tons of CO_2e annually, but will be revisited based on the mandatory emissions data to be reported by emissions sources region-wide, and additional facilities or entities may be brought into the program. Finally, the WCI Partner jurisdictions would like any states, provinces or tribes that have committed to making GHG emission reductions comparable to the WCI regional reduction goal to become Partners in the WCI.

1.6. Role of Other Policies

1.6.1. Definition

Other policies include complementary policies and alternative policies. A *complementary policy* is used in this context to mean policies other than a cap-and-trade program that aid in the goal of achieving emission reductions inside or outside the capped sectors. *An*

alternative policy is a policy that is employed in lieu of a cap-and-trade program for one or more sectors.

1.6.2. Design Recommendation

The role of other GHG-reducing policies is to help the WCI Partner jurisdictions achieve their 2020 reduction goal and provide other benefits. Those policies will work in concert with the cap-and-trade program and may apply to any source of GHG emissions.

In addition, the WCI Partner jurisdictions have agreed that individual jurisdictions may use fiscal measures that contribute to achieving overall comparable GHG emission reductions and internalize the price of carbon as expected through the regional cap-and-trade program for transportation and residential/commercial/small industrial fuel users. British Columbia currently has a carbon tax on these fuels. By 2012, the WCI Partner jurisdictions will determine the mechanism for integrating the cap-and-trade program with British Columbia's carbon tax.

1.6.3. Stakeholder Input

Many stakeholders emphasized the importance of complementary measures, especially for the residential, commercial, and transportation sectors. Others expressed concern that complementary measures would not provide the same level of certainty in emissions reductions from these sectors as would coverage under the cap.

1.6.4. Discussion of WCI Partners' Recommendation

The WCI Partner jurisdictions recognize that it will take numerous policies working in concert with cap-and-trade to achieve the regional reduction goal. The WCI economic analysis supports this point. It also makes sense: for example, codes that require energy efficient buildings complement the inclusion of electricity and residential, commercial, and small industrial fuel use under the cap.

In addition to aiding in the achievement of reductions at sources covered by the cap, complementary policies are needed for reductions at sources not covered by the cap-and-trade program. For example, during the first compliance period, the WCI Partners are recommending that complementary policies be instituted to reduce fuel demand in the transportation residential, and commercial sector, and by small industrial fuel users. This will help ensure consumers have real choices about the cars they drive, the fuels they use, and energy efficient appliances and buildings when these fuels are included in the cap-and-trade program in 2015.

The WCI Partner jurisdictions also agree that other policies, such as British Columbia's carbon tax, can be used as an alternative to cap-and-trade if designed to achieve comparable emission reductions and to internalize the cost of carbon for transportation fuel

and fuel use by residential, commercial, and small industrial sources, as expected through the cap-and-trade program.

1.7. Setting the Regional Cap for the Cap-and-Trade Program

1.7.1. Definition

The *regional cap* is the overall GHG emissions limit set for the facilities and entities covered by the cap-and-trade program. The cap declines over time to the desired reduction limit in 2020. For the WCI Partner jurisdictions, the program is designed to achieve their 2020 emissions goal.

1.7.2. Design Recommendation

The WCI Partner jurisdictions are recommending the following with respect to the aggregate regional emissions cap:

- The aggregate regional cap for the cap-and-trade program will (a) represent the sum of the WCI Partner jurisdictions allowance budgets; (b) include annual caps with three-year compliance periods, and (c) decline over time to reach the 2020 cap level.
- The initial 2012 regional cap will be set based on the best estimate of expected actual emissions. Among the factors that will be considered in making these estimates are population growth, economic growth, voluntary and mandatory emission reductions, and other factors including reporting data that is available when the cap is set. Of particular importance is that the voluntary emission reductions recognized through the issuance of Early Reduction Allowances be reflected in the estimates for the 2012 allowance budgets for each WCI Partner, and consequently the region as a whole (see Part 1.10 for a discussion of the Early Reduction Allowances). A mechanism will be developed that reconciles the 2012 allowance budgets for each Partner with the Early Reduction Allowances issued by each Partner.
- The 2015 regional cap will be set by adding the best estimate of actual emissions in 2015 from transportation fuels and residential, commercial, and industrial fuels (and any other sectors or sources that may be added to the program in 2015) to the emissions cap trajectory for the sources first included in the program in 2012.
- The 2020 regional cap will be set so that reductions achieved by the cap plus reductions from other GHG reduction policies will achieve the WCI 2020 regional emissions goal.
- Annual regional caps for calendar years 2012 through 2020 will be established before the start of the program in 2012 so that the total number of allowances issued in each three-year compliance period through 2020 will be known.
- The annual regional caps will only be adjusted for changes in WCI membership, changes in program scope or applicability thresholds, or to correct for data discovered

to be incorrect or inaccurate. Any adjustments will be made before the beginning of a compliance period.

1.7.3. Stakeholder Input

A number of stakeholders cautioned against beginning the cap-and-trade program with a cap that over-allocates emissions allowances, with some recommending use of actual, historic emissions as opposed to estimates of future emissions that rely on best available data. Many stakeholders expressed concern that setting the regional cap at the level of emissions expected in 2012 will encourage emitters to increase their emissions prior to the setting of the regional cap in order to increase the allowances in the system. Some stakeholders expressed support for setting the initial cap far ahead of the 2012 program start, so that the program reduces emissions in the first year and does not penalize early actions or create a "perverse incentive" for higher emissions before the program starts. Stakeholders were not unanimous on whether the cap should decline in a uniform straight line from the start of the program, or begin without a reduction and decline at an accelerating rate over time. Many stakeholders stressed the importance of having good emissions data for setting the cap to avoid over-allocation and to ensure more robust reductions from the program.

1.7.4. Discussion of WCI Partners' Recommendation

Recognizing that good emissions data will not be available before it is time to set the 2012 cap, the WCI Partner jurisdictions have accounted for the need to project actual emissions in the first year of the program. This projection will take into account population growth, economic growth, voluntary and mandatory emissions reductions, and other factors. Some WCI Partner jurisdictions will have limited emissions reporting in place prior to the recommended start of the WCI reporting in 2010; this reporting data will also be considered. The 2015 cap will bring in additional sectors under the cap, and the initial cap for these sectors will be established in a similar manner, with the reporting data playing a larger role.

The recommended approach for setting the 2012 emissions cap does not provide an incentive to increase emissions through 2012. The estimate for 2012 will be completed at the latest in 2010. Consequently, there is no opportunity to increase emissions prior to 2012 to influence the estimate of the 2012 emissions cap. Also, to provide an incentive to reduce emissions before the start of the program in 2012, the WCI Partner jurisdictions are recommending Early Reduction Allowances, which will provide allowances for certain voluntary reductions made during a specific period prior to 2012.

To guard against over-allocation, the WCI Partner jurisdictions have also recommended that the first five percent of the auctioned allowances have a minimum reserve price. If allowances are not purchased at or above the minimum reserve price, a portion will be retired, auctioned in a subsequent period, or distributed in a subsequent period. This

mechanism will serve to remove "extra" allowances from the market. This auction provision is detailed below in Part 1.9.

The WCI Partner jurisdictions are recommending that the annual regional caps from 2012 to 2020 follow a straight-line declining trajectory, recognizing that the total amount of allowances will increase in 2015 when transportation and other fuels are added to the program. It should be noted that the end point for 2020 will not change when those fuels are added. All caps will be established in advance of the start of the program in 2012 so that the reductions accomplished from the program will be known well in advance. Setting the caps in advance will also allow the WCI Partner jurisdictions to ensure the 2020 reduction goal will be met.

The economic modeling analysis suggests that the cap-and-trade program can achieve reductions from capped sectors consistent with the regional reduction goal with modest economic benefits. The cost per metric ton of allowances is expected to remain below $25 through 2020 with complementary policies, banking, and offsets. WCI's economic modeling found that the savings from reduced fuel expenditures under a cap-and-trade program with complementary policies could exceed the cost of additional investments in energy efficiency. The overall effect on the economy (e.g., the effect of the WCI program on state GDP, employment, and income) remains to be analyzed via additional macroeconomic modeling; however, prior modeling studies of other proposed cap-and-trade programs found that the economy can continue to grow robustly under well-designed climate policies.

1.8. Allowance Apportionment to WCI Partners

1.8.1. Definition

Allowance apportionment describes the individual Partner share of the overall "budget" of GHG emission allowances under a regional cap. An allowance budget must be set for each Partner jurisdiction.

1.8.2. Design Recommendation

The WCI Partner jurisdictions are recommending the following concerning the establishment of individual WCI Partner allowance budgets:[22]

- Each WCI Partner will have an annual allowance budget within the regional cap. All annual allowance budgets through 2020 will be established before the start of the program in 2012. The sum of the individual Partner's allowance budgets will equal the regional cap.

[22] The Allocation Options paper describes the advantages and disadvantages of different allocation options and the relevant design principles. Available at http://www.westernclimateinitiative.org/ewebeditpro/items/O104F14628.pdf.

- Each WCI Partner's 2012 allowance budget will be based on the best estimate of expected emissions for sources covered in the cap-and-trade program in the WCI Partner's jurisdiction in 2012, developed using the best available data and by accounting for expected changes in emissions in 2012. Population growth, economic growth, voluntary and mandatory emissions reductions, and other factors will be considered. Of particular importance is that the voluntary emission reductions recognized through the issuance of Early Reduction Allowances be reflected in the estimates for the 2012 allowance budgets. A mechanism is needed, and will be developed, that reconciles the 2012 allowance budgets for each Partner with the Early Reduction Allowances issued by each Partner.
- There will be a one-time adjustment in 2012 to each WCI Partner jurisdiction's allowance budget to account for the production and consumption of electricity megawatt hours within each WCI Partner jurisdiction, population growth, and the share of total WCI Partner jurisdictions emissions in 2001 through 2005. Each WCI Partner jurisdiction will make a one-time contribution of one percent of its 2012 budget to make these adjustments.
- For 2015, each WCI Partner jurisdiction's allowance budget will be set by adding the best estimate of expected actual emissions in 2015 from transportation, residential, and commercial fuels, and small industrial fuel users (and any other sectors or sources that may be added to the program for the first time in 2015) to the emissions trajectory for the sources first included in the program in 2012. The estimate of expected actual emissions in 2015 will be developed using the best available data (including available mandatory reporting data) and by accounting for expected changes in emissions in 2015 for the sources added to the cap at that time. Population growth, economic growth, voluntary and mandatory emissions reductions, and other factors will be considered in making the estimate.
- Each WCI Partner jurisdiction's 2020 allowance budget will be derived from its individual WCI Partner jurisdiction goal used for purposes of the program.[23] Reductions from other greenhouse gas reduction policies will also be considered.
- In order to avoid the double counting of emissions associated with electricity that is generated in one WCI Partner jurisdiction but consumed in another Partner jurisdiction, the affected WCI Partner jurisdictions will negotiate an equitable solution for apportioning those allowances.
- For years post-2020, the WCI Partner jurisdictions will set allowance budgets not less than three years in advance, based on future reduction limits or goals and using at least three years of reporting data for covered sectors.
- Individual WCI Partner jurisdiction allowance budgets will be established before the start of the program in 2012 and will only be adjusted for changes in WCI membership, changes in program scope or applicability thresholds, or to correct for errors discovered in the data.

[23] Partner goals are those reduction goals or limits that have been established by each individual WCI Partner jurisdiction for the cap-and-trade program.

1.8.3. Stakeholder Input

Stakeholders provided a wide diversity of comments on potential ways to apportion allowances among Partners, with little consensus on key issues particularly for the electricity sector. Many argued for emissions to be apportioned based on load while others were equally passionate that emissions be apportioned based on historical emission levels. The comments reflected the stakeholders' view of how the apportionment method selected might affect their potential to receive free allocation.

Several stakeholders called for WCI to recognize the voluntary market for Renewable Energy Credits (RECs) via a set-aside of allowances to reward or incentivize renewable investment at the regional or state and provincial level.

1.8.4. Discussion of the WCI Partners' Recommendation

The WCI Partners' recommendation for the establishment of individual WCI Partner jurisdiction allowance budgets reflects the special or unique circumstances in each state and province, including the mix of industries; the production and consumption of electricity and the source of that electricity; and expected growth in the economy and population. The WCI Partner jurisdictions agreed to make a one-time adjustment to take these factors into account. The formula for determining how to distribute the allowances associated with this adjustment will be part of the work plan for 2009 and beyond for the WCI Partner jurisdictions.

Nothing in this design precludes any individual WCI Partner jurisdiction from setting aside some amount of allowances to reward or incentive renewable energy. See Part 1.10 for the discussion on set-asides.

1.9. Allowance Distribution by Partners

1.9.1. Definition

Allowance distribution is the Partners' initial issuance of GHG emission allowances.

1.9.2. Design Recommendation

The WCI Partner jurisdictions are proposing the following approach to allowance distribution by the WCI Partners:[24]

[24] The Allocation Options paper describes the advantages and disadvantages of different allocation options and the relevant design principles. Available at http://www.westernclimateinitiative.org/ewebeditpro/items/O104F14628.pdf.

- Generally, allowance distribution will be done independently by each WCI Partner jurisdiction.
- In some cases, the WCI Partner jurisdictions have agreed to consider standardizing allowance distribution across specific sectors if analysis demonstrates uniform treatment is necessary to address competitiveness issues. This uniform treatment, if deemed necessary, will be implemented prior to the first compliance period.
- The WCI Partner jurisdictions have agreed that a portion of the *value* represented by each Partner's allowance budget (for example, through set-asides of allowances, a distribution of revenues from the auctioning of allowances, or other means) be dedicated to specific purposes that will benefit all of the WCI Partner jurisdictions. Those purposes are: energy efficiency; research, development, demonstrations, and deployment (RDD&D); agricultural and forestry sequestration; and adaptation to climate change impacts.
- The WCI Partner jurisdictions are recommending a number of other potential uses for the remaining allowance value. They are: reducing consumer impacts, especially for low-income consumers; providing for worker transition and green jobs; achieving emission reductions in communities that experience disproportionate environmental impacts; supporting community-wide efforts funded by local governments to reduce GHG emissions; providing transition assistance to industries; recognizing early actions to reduce emissions; and/or promoting economic efficiency.
- For the first compliance period, the WCI Partner jurisdictions will auction a *minimum* of 10 percent of the allowance budget, and to increase the minimum percentage to reach 25 percent in 2020. WCI aspires to reach higher auction percentages over time, possibly to 100 percent.
- Each WCI Partner jurisdiction may auction a greater percentage of its allowance budget at its discretion.
- Some jurisdictions may not have the legal authority to auction allowances and that will not prevent the other Partner jurisdictions with authority from doing so.
- Each WCI Partner will advise the other WCI Partners of its allocation methods before the program start, and at least one year in advance of the start of each subsequent compliance period.
- The WCI Partner jurisdictions have recommended that auctioning be coordinated through a regional auction platform. The design of the auction will be completed before the cap-and-trade program begins in 2012 and will consider how to prevent market manipulation under the auctions.
- To counter any potential oversupply of allowances in the emissions trading market, the WCI Partner jurisdictions recommend that the first five percent of the allowances auctioned during the first and second compliance period have a reserve price. Should some of the allowances not sell at the reserve price, the Partners may retire a fraction of the allowances or retain them to be auctioned in later compliance periods, as agreed to by the WCI Partners in advance.

1.9.3. Stakeholder Input

There were widely differing opinions about how the Partners should distribute allowances. Some commenters called for 100 percent free allocation to covered facilities and entities, while others favored a 100 percent auction of all allowances. Still others favored a hybrid with some distribution for free, such as to retail providers of electricity with the rest auctioned. Most stakeholders who advocated for 100 percent auction pointed to the Regional Greenhouse Gas Initiative (RGGI), which ultimately decided to auction nearly 100 percent of the allowances in that system. They expressed concern over the creation of windfall profits from the distribution of free allowances to covered facilities and entities. Some stakeholders asked that the approach for distributing allowances take into account competitiveness issues that may arise between similar industries and between industrial sectors under the cap-and-trade program. No common ground was found in the widely varying stakeholder views. A number of stakeholders commented on the use of auction revenue. A variety of uses and purposes were suggested.

1.9.4. Discussion of the WCI Partners' Recommendation

In making their recommendation on allowance distribution, the WCI Partners considered the following:

- Auctions are an efficient methodology to distribute allowances and some level of auction is necessary for price discovery, which may help to minimize price volatility, especially in the beginning of the program.
- The WCI Partner jurisdictions aspire to eventually achieve a nearly 100 percent level of auction.
- Unlike RGGI, which covers just the electricity sector in the Northeast and is a deregulated market, within the WCI most of the electric sector is vertically integrated and rate regulated. Auctions are not needed to address potential windfalls under these conditions, and the allowances that are provided will be used for public purposes.
- Like RGGI, the WCI Partners believe that the decision on the maximum amount of auctioned allowances is best left to that states and provinces. The RGGI states agreed to use a percentage of the value of the allowances for consumer benefit and strategic energy purposes. The decision to auction allowances was made by each participating state after consultation with stakeholders and legislators in part as the method to assure those uses were realized. The WCI Partner jurisdictions have recommended that the allowance value be used for purposes similar to RGGI. The allowance value could be from auction revenues, direct allocation of allowances for specific uses, through set-asides, or other means as determined by the individual states and provinces.

- In addition to electricity, the first compliance period covers industrial emission sources. Many industrial facilities face domestic and international competition from facilities that are not covered by climate policies. For those facilities that are unable to pass along compliance costs in the face of this competition, there is a substantial risk of emissions leakage: the emissions would shift to outside of the WCI Partner jurisdictions without reducing emissions overall. The related issue of job leakage or outsourcing, even to other parts of the United States or Canada, is a legitimate concern that needs to be considered by each state and province. As a regional program, the primary mechanism for addressing this leakage risk is through the judicious distribution of allowances to facilities to ensure that they have an incentive to reduce emissions, but are not disadvantaged competitively.
- If the WCI Partner jurisdictions had designed a federal program for either the US or Canada, the auction percentage would have been much higher because of the guaranteed national scope of the program and the additional policy levers available at the federal level, including the ability to address international competition.
- There is uncertainty regarding the status of future international climate agreements and which countries might be signatories to them, particularly China and India. Depending on the outcome, the portion auctioned in a federal program could be higher as the leakage issues are addressed through those international agreements.
- The WCI economic modeling found that combining cap-and-trade with a portfolio of complementary policies will make the program more cost-effective. Using some portion of allowance value for the uses recommended in the WCI design will help realize that cost-effectiveness.[25]

1.10. Early Reduction Allowances and Other Early Actions or Set-Asides

1.10.1. Definition

Early Reduction Allowances refers to rewarding certain greenhouse gas reductions that occur at facilities or entities covered by the cap-and-trade program prior to the start of the program and after a set starting date. *Early actions* refer more generally to activity that reduces emissions that may not qualify for Early Reduction Allowances. *Set-asides* are allowances that are allocated for specific purposes by individual WCI Partner jurisdictions.

1.10.2. Design Recommendation

The program will encourage entities and facilities included under the cap to reduce greenhouse gas emissions after January 1, 2008 and before the start of the first compliance period in 2012 through the issuance of Early Reduction Allowances. These allowances will be in addition to the WCI Partner jurisdictions' 2012 allowance budgets. By the end of

[25] This will recognize pre-existing commitments to action and legislative requirements on use of revenue (e.g., through BC's Climate Action Plan and Carbon Tax).

2009, the WCI Partner jurisdictions will jointly establish criteria to determine which early reductions will be eligible for these allowances. The criteria will ensure that the reductions are voluntary, additional/surplus, real, verifiable, permanent, and enforceable. Each WCI Partner jurisdiction that issues Early Reduction Allowances will do so in 2012. These Early Reduction Allowances will be treated like other allowances in the cap-and-trade program.

For all other early actions and all types of set-asides, each WCI Partner jurisdiction will have the discretion to determine which early actions it will recognize or whether and for what purposes allowances will be set-aside. Recognition for early action and other set-asides will come from within the cap and out of the individual WCI Partner jurisdiction's allowance budget.

1.10.3. Stakeholder Input

There was a general level of support for granting recognition for early actions through the award of allowances. Some commenters favored awarding those allowances through set-asides coming out of individual WCI Partner allowance budgets. However, most commenters preferred that allowances be issued in addition to each WCI Partner's allowance budget as the only meaningful way to recognize GHG emission reductions that are taken prior to program launch.

1.10.4. Discussion of WCI Partners' Recommendation

The recommendation allows for the award of Early Reduction Allowances to facilities and entities that will be covered by the program that reduce their emissions on or after January 1, 2008 and before January 1, 2012. The WCI Partner jurisdictions will develop the additional criteria for determining which reduction activities will be eligible for Early Reduction Allowances. All Early Reduction Allowances will be allocated to the facilities and entities that have made reductions that are eligible for these allowances in 2012 only. Entities that will be covered by the program in 2015 may be eligible for these allowances and will also receive them in 2012.

The WCI Partner jurisdictions believe that the granting of Early Reduction Allowances provides an additional incentive for facilities and entities that will be covered by the cap-and-trade program to reduce emissions prior to the program start. Awarding these allowances will not result in an over-allocation of allowances because the Early Reduction Allowances will apply to reductions of emissions that would have otherwise been included in each Partner's 2012 allowance budget. This design recommendation is consistent with the Northeast NO_x Budget Cap-and-Trade Program, as well as the subsequent U.S. Environmental Protection Agency (EPA) NO_x SIP-Call Program.

The WCI Partner jurisdictions also recognize that there are specific purposes for which allowance set-asides may be warranted. For example, a WCI Partner jurisdiction with hydro power may want to set-aside allowances for use during low water years. Alternatively, a WCI Partner jurisdiction may want to recognize early reduction activities that do not qualify

for Early Reduction Allowances. Each Partner will have the discretion to create set-asides for specific purposes; any allowances used for these purposes will come from the Partner's allowance budget.

1.11. Banking, Borrowing and Compliance Periods

1.11.1. Definitions

Banking of emissions allowances and offset credits means that holders of the allowance or offset credit may use the allowance or credit that is received or purchased in one compliance period for sale or use in a subsequent compliance period. *Borrowing* means using allowances from a future compliance period to cover a compliance obligation in a current compliance period.

1.11.2. Design Recommendation

Emission allowances will not expire. Parties who own emission allowances will be allowed to hold, or "bank," the allowances without limitation, except to the extent that restrictions on the number of allowances any one party may hold are necessary to prevent market manipulation.

Borrowing of allowances will not be permitted.

Each compliance period will cover three specific years: 2012–2014 is the first compliance period; 2015–2017 is the second compliance period, and 2018–2020 is the third compliance period. The compliance periods will not be rolling periods. Each will start on January 1 of the first year of the compliance period.

1.11.3. Stakeholder Input

Stakeholders who commented on these issues generally favored allowing unlimited banking of allowances. Some commenters expressed concern that extensive banking could lead to manipulation of the market. Borrowing attracted some favorable comments, but also a number of negative comments. Nearly all commenters favored a multi-year compliance period.

1.11.4. Discussion of WCI Partners' Recommendation

Banking of allowances can encourage early compliance. Banking of allowances can reduce volatility over time by providing liquidity in the market. It can also give facilities and entities a stake in the continued operation of the program in that banked allowances are a financial asset. In the economic analysis conducted for the WCI program design, banking moderated allowance prices more than any other program design element, including offsets, thereby reducing the costs of the program. Banking has been used in the U.S. Acid Rain

cap-and-trade program, as well as the NO_x budget trading program in the Eastern United States.

The WCI Partner jurisdictions have recommended that banking of allowances be allowed without limit, except to the extent that limits on banking prove necessary to prevent market manipulation. This is an issue that the WCI Partner jurisdictions will analyze prior to the start of the program.

Borrowing of allowances will not be allowed in the WCI cap-and-trade program. Borrowing creates a risk of undermining the program because the practice creates a debt, and could result in facilities and entities with a large debt asking for relief. Such relief may result in an over-allocation of allowances, a breaking of the emissions cap or exemptions from the program's coverage. No U.S. cap-and-trade system to date has allowed borrowing.

The three-year compliance period will allow covered facilities and entities to manage planned or emergency changes in operations over the short term, as well as low water years that might affect the generation of hydro electricity.

1.12. Offsets and Allowances from Other Cap-and-Trade Systems

1.12.1. Definition

Offsets are GHG emission reductions, GHG emissions avoided, or GHG removals from the atmosphere, measured in metric tons of CO_2e. Offsets are achieved by *offset projects*. *Offset credits* (also measured in metric tons of CO_2e) are issued for offsets that are achieved by offset projects that meet certain criteria. Offset credits can be traded, and can be used for compliance purposes, or as part of voluntary actions. When used within a cap-and-trade program, offset credits used for compliance purposes come from emission sources or sinks not covered by the cap.

Emission allowances from other cap-and-trade systems are regulatory instruments used to limit GHG emissions. These emission allowances are issued by appropriate government regulatory authorities and are used for compliance purposes.

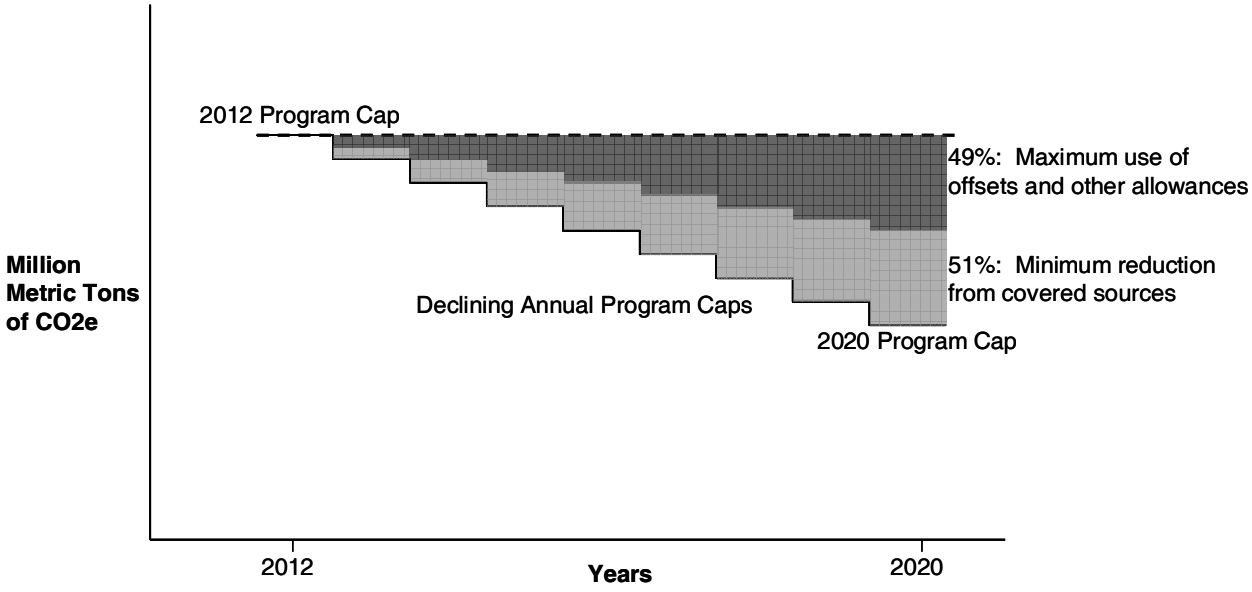
1.12.2. Design Recommendation

The WCI Partners are recommending a rigorous offset program. The purpose of the offset program is to reduce compliance costs while encouraging emission reductions, innovation, and technology development for sources and sinks not covered by the cap-and-trade program. In order to achieve these goals, the WCI Partners recommend the following offset program design features:[26]

[26] The Offsets Options Paper describes how, in developing its recommendation, the Offsets subcommittee defined a range of options, including whether to have offsets, and whether to limit their quantity, location, and type. Available at http://www.westernclimateinitiative.org/ewebeditpro/items/O104F14585.PDF . WCI

- The WCI Partner jurisdictions will establish standards and processes for issuing offset credits, accepting offset credits from the Clean Development Mechanism (CDM), and recognizing emission allowances from other GHG trading systems. The offset credits issued or recognized by the WCI Partner jurisdictions and emission allowances from other GHG trading systems recognized by the WCI Partner jurisdictions can be used for compliance purposes in the WCI Partner jurisdictions cap-and-trade program. The standards and processes will be developed and implemented in an open and transparent manner that will be well-defined in advance of the start of the cap-and-trade program.
- The WCI Partner jurisdiction will limit the use of all offsets and allowances from other GHG emission trading systems that are recognized by the WCI Partner jurisdictions to no more than 49 percent of the total emission reductions from 2012-2020. This limit will ensure that a majority of emission reductions occur at WCI covered entities and facilities. The 49 percent limit is conceptually illustrated in Figure A.

Figure A: Illustration of the 49 Percent Offsets Limit



This illustration shows how the limit on the use of all offsets and allowances from other systems is limited to 49 percent of total emission reductions starting from the 2012 program emissions cap. For simplicity, this illustration does not show the expansion of the program scope in 2015.

held an Offsets Public Workshop to help inform its recommendation. Workshop materials are available at http://www.westernclimateinitiative.org/WCI_Meetings_Events.cfm . The Offsets subcommittee defined criteria and objectives for the offsets program. See the Offsets Draft Design Recommendations for details. Available at http://www.westernclimateinitiative.org/ewebeditpro/items/O104F16589.PDF

- Each WCI Partner jurisdiction will have the discretion to set a lower limit on the use of offsets and allowances from other trading systems.
- The WCI Partner jurisdictions will jointly establish criteria to ensure that all offset projects used to meet a compliance obligation result in a GHG reduction, removal or avoidance that is real, surplus/additional, verifiable and permanent. The criteria will be used to ensure that the quantification of the GHG reduction, removal, or avoidance is accurate and not double counted.
- In addition, offset projects must be enforceable by the individual WCI Partner jurisdiction that is issuing the credit and the credit must be verifiable by the individual WCI Partner jurisdiction that is accepting it.
- The standards and processes for approving offset projects will be developed and implemented in an open and transparent manner that will be well-defined in advance of the start of the cap-and-trade program.
- Offset credits will not be approved for projects that reduce, remove or avoid emissions from sources covered by the WCI cap-and-trade program.
- The WCI Partner jurisdictions have identified the following list of project types as a priority for investigation and potential participation in the offset program:
    - Agriculture (soil sequestration and manure management);
    - Forestry (afforestation/reforestation, forest management, forest preservation/conservation, forest products); and
    - Waste management (landfill gas and wastewater management).
- Starting in 2009, the WCI Partner jurisdictions will jointly coordinate to review, develop and approve protocols for the project types that meet the necessary criteria for inclusion. At the same time, WCI Partner jurisdictions will initiate the establishment of a process to coordinate the review and approval of other project types and protocols proposed by project developers.
- WCI Partner jurisdictions will recognize offsets meeting the WCI criteria within their own jurisdictions regardless of which WCI Partner jurisdiction issued them. Offsets not meeting the WCI criteria will not be accepted for compliance purposes.
- The WCI Partner jurisdictions are recommending the following geographical parameters for offsets:
    - WCI Partner jurisdictions may approve, certify, and issue offset credits for projects located throughout the United States, Canada, and Mexico where such projects are subject to comparably rigorous oversight, validation, verification and enforcement as those located within the WCI jurisdictions.
    - WCI Partner jurisdictions will not accept offset credits for GHG reductions in developed countries (Annex 1 countries in the UN Framework Convention on Climate Change) for projects that reduce, remove, or avoid emissions from sources that within WCI Partner jurisdictions are covered by the cap-and-trade program.

- The WCI Partner jurisdictions may accept offset credits from developing countries through, for example, the Clean Development Mechanism (CDM) mechanism of the Kyoto Protocol, and the WCI Partner jurisdictions may establish added criteria to ensure similar rigor to WCI approved/certified offset projects or other requirements appropriate to enable use of these offset credits in the cap-and-trade program.
- The WCI Partner jurisdictions encourage the development of offset projects located inside WCI Partner jurisdictions for compliance purposes in the WCI cap-and-trade regulatory program in order to capture collateral benefits associated with some offsets projects, such as health, social, and environmental benefits.

1.12.3. Stakeholder Input

Stakeholders generally supported a rigorous offset program. Underlying the support for an offset program is the recognition that all offsets used for compliance purposes must be of the highest quality. Stakeholders referenced issues that have arisen in previous offset programs, including the CDM, to highlight the importance of developing and applying project protocols that ensure that reductions are real, surplus/additional, verifiable, permanent, and enforceable.

Stakeholders were divided on whether the use of offsets for compliance purposes should be limited either in quantity or location. Some stakeholders suggested that there is no need to limit the use of high quality offsets because they reflect real emission reductions. Some stakeholders objected to the use of any offsets, pointing out the existing disproportionate environmental impacts experienced in some communities. Many stakeholders expressed a strong preference for a limitation on the use of offsets to ensure that a majority of reductions are made at covered facilities or entities. Many others favored no limitation provided the offsets meet rigorous criteria.

Many stakeholders expressed support for specific types of offsets. Many stakeholders also commented that the offset limitation should be applied to the reductions that are required, not to the compliance obligation of a facility or entity. Finally, some stakeholders recommended that the location of offset projects be limited to within WCI partner jurisdictions in order to assure enforcement and verification or so that the environmental co-benefits of the projects would be realized within the WCI jurisdictions. Others argued that any reduction in greenhouse gases in the world is important to combat climate change and thus the location of the project should not matter.

1.12.4. Discussion of WCI Partners' Recommendation

The WCI Partners believe that the program as designed will result in a rigorous offset program. The Partners recognize that issues have been raised regarding the quality of offsets from previous programs and the Partners propose to learn from past efforts, to build

on their strengths and avoid their weaknesses. Toward this end, the Partners will develop and implement the offset program in an open and transparent manner that incorporates stakeholder input and involvement.

In making the recommendations in the program design, the WCI Partner jurisdictions considered the following:

- Offsets are an important tool to manage the risks of unexpectedly high compliance costs. Multiple analyses, including the economic analysis conducted for the WCI Partner jurisdictions, highlight the role that offsets can play in reducing the risks of high compliance costs.
- The quality of the offset project matters. It must be real, additional/surplus, permanent, verifiable, and enforceable.
- The criteria and protocols for offsets are critically important and will be developed by the WCI partner jurisdictions jointly.
- The manner in which greenhouse gases, especially carbon dioxide, mix in the atmosphere means that a reduction in any location is important to address global climate change.
- The wording of the Initiative signed by the Governors and Premiers calls for a design of a market program that will reduce greenhouse gases in the WCI Partner jurisdictions collectively "and to achieve related co-benefits."
- Co-benefits include the innovation that comes from moving toward a low carbon economy, which the cap incentivizes.
- The majority of emission reductions - at least 51 percent - will come from facilities and entities covered by the WCI program. This will help initiate the transformation to a low- carbon future within the WCI jurisdictions.
- Any WCI Partner jurisdiction that sets a limit lower than 49 percent will reduce the use of offsets and allowances from other systems from its portion of the total.
- Offset projects in developed countries (including Canada and the United States) that reduce emissions from sources that would be covered by the cap-and-trade program were they in the WCI Partner jurisdictions are not eligible to create offset credits. The WCI Partners have excluded offset credits from these projects in developed countries to avoid providing an incentive to delay the adoption of policies to reduce GHG emissions.
- Offset projects located outside the WCI jurisdictions that are subject to comparably rigorous oversight, validation, verification, and enforcement as those located within the WCI jurisdictions should help reduce compliance costs.
- The WCI Partner jurisdictions recognize that flexibility to use the limited amount of offsets and allowances from other systems any time throughout the period of 2012-2020 may help contain compliance costs. Therefore, the offset program may

incorporate flexibility to use offsets and non-WCI allowances across the three compliance periods, which each WCI Partner jurisdiction could use at its discretion.

- The WCI economic modeling analysis found that offsets contribute to managing the risk of high compliance costs in combination with banking and complementary policies. However, the analysis indicated that limiting the use of offsets and allowances from other programs to 49 percent of the reductions achieved by the program should provide adequate cost moderation.

The WCI Partner jurisdictions will establish eligible WCI offset project types, as well as requirements, methodologies and measurement and verification protocols, in advance of the program start. This approach will help ensure that project developers clearly understand the requirements for achieving acceptable reductions before the project begins. The WCI Partner jurisdictions will also develop a process by which offset project developers can propose additional offset project types for approval.

The WCI Partners did not include a recommendation to limit offset projects to WCI Partner jurisdictions in order to provide opportunities for additional low-cost reductions within the system, to support emission reductions on a global scale, and because of concerns that such a limitation may not withstand legal challenges.

1.13. Cost Containment

1.13.1. Definition

Cost containment is keeping the costs of program as low as possible, consistent with program objectives. There are a variety of cost containment mechanisms that can help manage the cost of compliance for covered entities in a cap-and-trade program. The cap-and-trade program is itself a form of cost containment, since emission trading minimizes costs. Offsets, described above, are a cost containment mechanism. Temporal flexibility, including banking, borrowing, and the length of the compliance period, is another.

1.13.2. Design Recommendation

The WCI Partner jurisdictions are recommending a broad scope and the inclusion of offsets as described above. They also recommend that purchasers and covered entities be allowed to bank allowances, without restrictions on the amount of allowances that may be banked or on how long they may be banked. WCI Partner jurisdictions recommend that borrowing of allowances from future compliance periods not be allowed. The WCI Partners recommend the compliance periods be three years long.

1.13.3. Stakeholder Input

Stakeholder input generally favored the inclusion of the cost-containment features of a broad cap-and-trade program, some offsets component, and unlimited banking. Stakeholder comment generally did not favor borrowing. In addition, some stakeholders called for an emergency clause, allowance price cap, or exit ramp in the event of a significant economic crisis attributable to the cap-and-trade program.

1.13.4. Discussion of WCI Partners' Recommendation

The WCI Partner jurisdictions have made a number of design decisions that will contain costs.

- The broad scope affords numerous opportunities to contain costs through emission trading.
- Temporal flexibility allows firms greater flexibility in compliance. Such flexibility can reduce allowance price volatility.
- Unlimited banking will help address price volatility.
- Complementary programs will also contain costs, and the program encourages their use.
- Offsets will also help contain costs.

The WCI Partner jurisdictions did not include borrowing for the reasons noted in Part 1.11. An allowance price cap was also not included because of the potential to exceed the cap and not meet the emission goal in 2020. The WCI Partners hope to link this program to other similarly rigorous programs, possibly including the EU ETS. It is the understanding of the WCI Partner jurisdictions that the EU will not link to a system with a price cap. Finally, the WCI Partner jurisdictions did not include an escape clause because each WCI Partner jurisdiction has its own laws on emergency action that must be considered in the development of any such recommendation.

1.14. Reporting

1.14.1. Definition

Reporting describes the required monitoring and measurement of GHG emissions by facilities and entities, and how these emissions will be reported.

1.14.2. Design Recommendation

The WCI Partner jurisdictions recommend that mandatory measurement and monitoring for the six included GHGs commence January 2010 with reporting of the 2010 calendar year emissions beginning in early 2011. The entities and facilities subject to reporting are those with annual emissions equal to or greater than 10,000 metric tons of CO_2e. Where fuel

combustion emissions are covered upstream (e.g., emissions from transportation fuel combustion and emissions from fuel combustion at residential, commercial, and industrial facilities with emissions below the threshold) the reporting threshold will apply to entities (e.g., fuel distributors and blenders) based on the expected combustion emissions from the fuels distributed. However, in some limited instances the threshold may be based on other parameters, such as throughput or capacity, as long as these thresholds represent the equivalent of, or are lower than, the 10,000-metric-ton threshold.

WCI Partner jurisdictions will require third-party verification of reported emissions from entities and facilities that will be included under the cap.

Prior to the start of the mandatory reporting program, the WCI Partner jurisdictions will establish the essential requirements for reporting by all entities and facilities required to report in each of the WCI Partner jurisdictions. Essential requirements will include specifics regarding:

- Applicability and Boundaries
- Definitions
- Timing
- Report Content and Submittal
- Pollutants and Equivalence Factors
- Compliance
- Verification/Audit/Quality Assurance
- Emissions Quantification and Monitoring

As each WCI Partner jurisdiction collects additional emissions data from entities and facilities required to report, certain data will be made available to all WCI Partner jurisdictions for review and consideration for possible expansion of the cap-and-trade program.

Each WCI Partner jurisdiction will maintain discretion to require reporting at lower thresholds or from entities and facilities outside of the cap-and-trade program.

1.14.3. Stakeholder Input

Stakeholders said they want a reporting system that is fair, easy to manage, and not costly for reporters or WCI Partner jurisdictions. Stakeholders generally supported a transparent and robust accounting system for consistent and accurate reporting of emissions across sectors and jurisdictions. There was substantial support for the WCI Partner jurisdictions' efforts to harmonize WCI reporting and future federal greenhouse gas reporting, and there was concern regarding the burdens of having to report differently to multiple programs. Stakeholders overwhelmingly supported beginning reporting before cap-and-trade commences, in order to have accurately measured emissions as a basis for allocating allowances. Stakeholders were generally split on the topic of third-party verification.

Additional opportunities for stakeholder input will be available during the fall of 2008 as the essential requirements for reporting continue to be developed and the final draft is released in December of 2008.

1.14.4. Discussion of WCI Partners' Recommendations

Comprehensive mandatory and accurate reporting is especially important to a cap-and-trade program because of its focus on actual emissions performance and emission allowance trading. The WCI Partner jurisdictions' recommendations are consistent with the overwhelming stakeholder support for beginning reporting before cap-and-trade commences, and with the general support for the development of uniform WCI-wide reporting rules to maximize administrative simplicity and cost effectiveness.

The WCI Partners recognize the burdens that would be created by multiple widely divergent reporting programs, and will seek to harmonize reporting across WCI Partner jurisdictions. The WCI Partner jurisdictions will encourage federal reporting program development to consider the need for flexibility and accommodation of the needs of regional cap-and-trade programs already far along in their development.

The WCI Partner jurisdictions recommend a reporting threshold lower than the threshold for inclusion in the cap-and-trade program for several reasons. First, reporting must be at a lower level to ensure that accurate, verified emissions data support the exclusion of a sub-threshold entity or facility from the obligation to hold allowances. Second, reporting down to a threshold of 10,000 metric tons of CO_2e is needed to determine whether the threshold for inclusion in the cap-and-trade program is set at the appropriate level to include a high proportion of emissions. Third the lower reporting threshold is required to monitor potential leakage to facilities or entities below the threshold of the cap-and-trade program. Finally, a threshold of 10,000 metric tons of CO_2e is being considered in potential legislation for a U.S. federal cap-and-trade program.

The WCI Partner jurisdictions have considered the advantages and disadvantages of third-party verification and jurisdictional audit and quality assurance. The WCI Partner jurisdictions note that in a cap-and-trade program, every metric ton of emissions translates into a financial obligation or benefit, whereas in existing air pollutant reporting and compliance, errors in emissions data can be inconsequential if they do not affect whether a compliance limit has been exceeded. For those facilities and entities with compliance obligations, there are no inconsequential emissions totals. A high degree of accuracy and reliability for this emissions data is needed for market transparency and credibility, as well as for potential linkage to other emissions trading programs.

1.15. Enforcement

1.15.1. Definition

Enforcement is the means of assuring covered entities' compliance with the cap-and-trade program.

1.15.2. Design Recommendation

The WCI Partner jurisdictions recommend that if a covered entity or facility does not have sufficient allowances at the end of a compliance period, the entity or facility shall be required to surrender three allowances for every excess metric ton of CO2e to the jurisdiction to which they have the compliance obligation within three months of the end of each compliance period. This does not preclude other penalties allowed under individual state or provincial laws. Each WCI Partner jurisdiction will retain its existing regulatory and enforcement authority and responsibilities.

1.15.3. Stakeholder Input

Stakeholders generally recognized the importance of having an enforcement mechanism. A number of stakeholders noted a preference for financial penalties or a combined policy that calls for a violator to surrender required allowances and pay a fine. Additionally, some stakeholders requested greater flexibility during the first compliance period while regulated sources become familiar with the program. Stakeholders also highlighted the importance of transparency in the enforcement process, specifically recommending that information be made public regarding the use and origin of offset credits for compliance.

1.15.4. Discussion of WCI Partners' Recommendation

In any cap-and-trade program, participants must be accountable for their emissions and must comply with requirements for monitoring, reporting, and holding adequate emissions allowances. The enforcing jurisdiction must provide certainty through well-recognized and automatic penalties for non-compliance. Previous well-designed cap-and-trade programs have had compliance rates over 99 percent. [27]

The enforcement mechanism recommended by the WCI Partner jurisdictions is the same as the NO_x Budget Program in the northeastern United States. The Partners did not recommend a financial penalty because the price of allowances will be set by the market. It will be impossible to assure a set penalty amount will be higher than the cost of allowances.

[27] Recommendations for Designing a Greenhouse Gas Cap-and-Trade System for California, available online at http://climatechange.ca.gov/publications/market_advisory_committee/2007-06-29_MAC_FINAL_REPORT.PDF.

However, each WCI Partner jurisdiction may establish additional penalties, including civil and criminal penalties for intentional violations of program requirements. Such penalties provide an additional level of deterrence to ensure that the financial incentives associated with the cap-and-trade program are not abused and to increase confidence in the integrity of the market and the value of an allowance.

The WCI Partner jurisdictions also recommend that certain data from the emissions reports, allowances, and offsets that are used for compliance be made public in a timely manner to ensure transparency and maintain public confidence.

1.16. Regional Organization

1.16.1. Definition

A *regional organization* centralizes the execution of administrative tasks for the WCI Partner jurisdictions. It has no authority beyond that of the individual WCI Partner jurisdictions.

1.16.2. Design Recommendation

The WCI Partner jurisdictions will create a regional administrative organization to:

- Coordinate the regional auction of allowances;
- Track emissions and provide public information on progress towards the WCI regional goal;
- Monitor and report on market activity, including any potential market manipulation;
- Serve as a forum for WCI Partners to update one another on program progress;
- Coordinate review and adoption of protocols for offsets;
- Coordinate review and adoption of updated reporting requirements and emissions measurement methods;
- Coordinate review and issuance of offset credits; and
- Suggest criteria and means to accredit service providers to deliver validation and verification services.

1.16.3. Stakeholder Input

Stakeholders generally emphasized the need for coordination across the region to ensure consistency in the program.

1.16.4. Discussion of WCI Partners' Recommendation

The regional organization recommendation is designed to help the WCI Partner jurisdictions achieve the necessary coordination. Each jurisdiction will retain its regulatory authority and enforcement responsibilities. By centralizing administrative tasks and coordinating WCI Partner activities, the regional organization will help reduce administrative costs and

improve program transparency and consistency. RGGI has such an organization and it has thus far been successful in facilitating consistent implementation of RGGI's cap-and-trade program across the RGGI states.

1.17. Other Issues Raised by Stakeholders

A few stakeholders have also raised issues around market manipulation. The WCI Partners will continue to examine this issue and are committed to taking steps as the program is further designed to minimize the potential for manipulation. Evidence from existing and past allowance systems has not revealed compelling evidence that market manipulation through collusion or other market gaming situations has occurred. Price distortions did occur where there was not full price disclosure or when trading was thin, causing price volatility.

2. Overview of Cap-and-Trade

A cap-and-trade program sets a clear, mandatory, enforceable limit on GHG emissions and then allows the market to identify the least-cost ways to achieve the limit. The state or provincial government sets an absolute aggregate limit (or "cap") on GHG emissions from a sector or multiple sectors. Tradable emissions "allowances," or limited authorizations to emit,[28] are then distributed in an amount that equals the total emissions permitted by the cap, which may decline over time. These allowances can be distributed by auction, free allocation, or a combination of the two. The government specifies which entities or facilities must surrender allowances to cover their emissions at the end of a pre-determined period of time, which is called the "compliance period."

After allowances are issued by governments, they can be bought and sold ("traded"). The limit on the total number of allowances, combined with the requirement to surrender allowances to cover emissions, makes allowances valuable and scarce. Allowance trading occurs because participants face different costs for reducing emissions. Trading allowances reveals a market price for them. The price is an incentive to facilities and entities with emissions to either invest in reductions that will let them sell allowances or avoid the cost of buying them. For some participants, implementing new, low-emitting technologies may be relatively inexpensive. Those participants will buy fewer allowances or sell surplus allowances to participants that face higher emission control costs. A participant will choose to buy more allowances when the cost of an allowance is lower than the cost of reducing its emissions. By giving participants a financial incentive to control emissions and the flexibility to determine how and when emissions will be reduced, the capped level of emissions is achieved in a manner that minimizes the cost of emissions reductions.

[28] Emission allowances are not considered property rights but are a limited authorization to emit.

Emissions trading programs have been successfully implemented in the United States and other countries to control other types of emissions, such as acid rain pollutants like sulfur dioxide (SO_2), in an environmentally sound, cost-effective manner.[29]

When designed properly, cap-and-trade programs provide certainty on the level of emissions reductions achieved and help ensure these reductions are attained at the lowest cost. The cap creates a firm limit on GHG emissions. By letting individual sources choose when and how to reduce emissions, cap-and-trade minimizes the cost of emission reduction. It also stimulates the development of new technological solutions that can enable lower-cost reductions now and in the future.

Cap-and-trade programs may also cost governments less to implement than command-and-control programs in which governments specify various performance, operational, or emission requirements based upon technology.[30] The state or province needs only (1) to ensure that covered sources accurately report their emissions and, at the end of each compliance period, surrender a number of allowances equal to their emissions; and (2) to provide some market oversight to ensure fair competition.

When designed properly, cap-and-trade programs can be particularly useful in the effort to address climate change and can aid more traditional policies in achieving emissions reductions. Greenhouse gas emissions come from many different kinds of sources with widely varying options for achieving emission reductions, affording numerous opportunities for mutually advantageous trading. Also, the location of a given emissions reduction does not matter with respect to climate change. A GHG cap-and-trade program is environmentally effective because a ton of carbon dioxide (CO_2) or other greenhouse gas emitted from one source has the same global warming effect as a ton emitted from any other.[31]

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[29] Estimated savings for Phases I and II of the Acid Rain Program were more than $1 billion in 1995 dollars. The cost savings estimated in comparison to command-and-control approaches were estimated to be about 44-55 percent of the total compliance costs. *See for example* Carlson, C. P., D. Burtraw, M. Cropper, and K. L. Palmer. 2000. Sulfur dioxide control by electric utilities. *Journal of Political Economy* 108 (6):1292-1326. Ellerman, A. D., P. L. Joskow, R. Schmalensee, J. Montero, E. M. Bailey. 2000. *Markets for Clean Air: The US Acid Rain Program*. Cambridge: Cambridge University Press.

[30] For example, the U.S. acid rain program requires a staff of approximately 50 people to track all emissions data, allowance transfers, and compliance for over 4000 sources, including auditing of all hourly emissions data, tracking several thousand allowance transfers per year, annual compliance determination, and annual program assessment. See *Recommendations for Designing a Greenhouse Gas Cap-and-Trade System for California*. Recommendations of the Market Advisory Committee to the California Air Resources Board, June 2007, p. 73 and 99. Available online at www.pewclimate.org/docUploads/2007-06-29_MAC_FINAL_REPORT.pdf

[31] From a climate change perspective, because GHGs are chemically stable and persist in the atmosphere for a decade or longer and become well mixed throughout the atmosphere, the location of the reduction does not matter. Still, there may be other important policy reasons to consider the location of GHG reductions.

2.1. The Reasons for a Regional Cap-and-Trade Program

The reasons for coordinating regionally to design and implement a cap-and-trade program are compelling. A vast body of literature makes the case for a GHG cap-and-trade system that maximizes coverage of emissions and minimizes the costs of achieving a given GHG emissions level. Cap-and-trade has been applied successfully in the United States and Canada and in other regions to reduce other pollutants, and a number of countries have implemented such a system for GHGs under the Kyoto Protocol of the UN Framework Convention on Climate Change. In the absence of U.S. and Canadian federal engagement in these efforts, many U.S. states and Canadian provinces are moving ahead on their own and/or in cooperation with neighboring states and provinces to reduce GHG emissions.[32]

Because of their broader coverage, regional cap-and-trade programs perform better than individual state or provincial programs can in terms of realizing cost savings from trade, maintaining competitiveness and avoiding emissions leakage. Emissions leakage occurs when economic activity and associated emissions shift out of the jurisdiction covered by the policy in order to avoid the costs of compliance. The regional program levels the competitive playing field across the participating jurisdictions, thereby reducing the risk of emissions leakage.

Regional cap-and-trade programs can be more efficient and effective than state-by-state and province-by-province efforts because they cover more emissions sources and provide greater opportunities for mutually beneficial transactions. Administrative and technical support functions can also be shared among the participating jurisdictions, lowering the overall costs of implementation. Regional cap-and-trade programs can also help move the United States and Canada toward federal-level policies by acting as laboratories for program design and implementation. RGGI, for example, has advanced the debate in the United States around a number of cap-and-trade design issues, including allowance auctioning and offsets. WCI jurisdictions hope that their own analyses, deliberations, decisions, and implementation experiences will help to accelerate the development of U.S., Canadian, and global GHG markets.

2.2. Lessons from the European Union

The European Union (EU) developed a cap-and-trade program to meet its GHG reduction obligation under the Kyoto Protocol. The EU Emissions Trading Scheme (ETS) covers carbon dioxide emissions from certain sectors, including power generation, certain industrial process sources, and all large industrial combustion facilities. Proposed in 2001, the EU ETS began its three-year "learning phase" in 2005. The goal of the learning phase was to

[32] In addition to the states and provinces participating in the WCI, ten Northeast states (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont) have joined to form Regional Greenhouse Gas Initiative (www.rggi.org), which is a cap-and-trade program for CO_2 from electrical utilities, and six Mid-Western States (Iowa, Illinois, Kansas, Michigan, Minnesota, and Wisconsin) and one Canadian Province (Manitoba) have signed on to the Mid-Western Greenhouse Gas Reduction Accord (www.midwesternaccord.org) to design a cap-and-trade program for their region.

develop the infrastructure and experience to successfully implement a cap-and-trade program during the second trading period, which started in 2008, and not to achieve significant reductions in GHG emissions, per se.[33]

A number of lessons can be drawn from the EU ETS. In particular, the EU ETS learning phase demonstrated:

- The importance of accurate emissions data to create an effective trading system that results in sufficient emissions reductions and to ensure that the appropriate number of allowances is distributed;
- That cost containment measures such as banking and multi-year compliance periods tend to reduce market volatility;
- Suppliers quickly factor the price of emissions allowances into their business decisions under a cap-and-trade program;
- The relationship between allowance allocation, allowance markets, and electricity regulation must be understood and addressed to avoid unintended consequences; and
- The linkage of 28 separate trading programs in the EU ETS provides a valuable prototype for a globally linked carbon market.

2.3. Lessons from Other Emission Trading Programs[34]

The United States has implemented six emissions trading programs since the late 1970s: the early U.S. EPA emissions trading programs,[35] the federal Lead-in-Gasoline, Acid Rain, and Mobile Source trading programs; the northeast regional NOx Budget Trading Program, and the Los Angeles Air Basin RECLAIM program. From an examination of the literature and experiences with these programs, there are important lessons and recommendations that emerge:

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[33] For a full examination of the EU ETS, see Ellerman, D. A. and P. Jaskow. 2008. *The European Union's Emissions Trading System in Perspective.* Pew Center on Global Climate Change. Available online at: www.pewclimate.org/docUploads/EU-ETS-In-Perspective-Report.pdf

[34] *See for example* www.epa.gov/airmarkets.usca; Aulisi, A., A. E. Farrell, J. Pershing, and S. Vandeveer. 2005. *Greenhouse Gas Emissions Trading in U.S. States. WRI White Paper.* Available online at http://pdf.wri.org/nox_ghg.pdf. Ellerman, A. D., P. L. Joskow, and D. Harrison, Jr. 2003. *Emissions Trading in the U.S*. Pew Center on Global Climate Change. Available online at www.pewclimate.org/global-warming-in-depth/all_reports/emissions_trading. *Climate Change 101: Cap and Trade*. Pew Center on Global Climate Change and Pew Center on States. Available online at www.pewclimate.org/docUploads/Cap&Trade.pdf.

[35] The early EPA programs included four programs—collectively referred to as EPA Emissions Trading or EPA ET—are related by the common objective of providing sources with flexibility to comply with traditional source-specific command-and-control standards while maintaining environmental objectives focused primarily on local air quality. They included netting, offsets, bubbles, and banking. *See* Ellerman, A. D., P. L. Joskow, and D. Harrison, Jr. 2003. *Emissions Trading in the U.S*. Pew Center on Global Climate Change.

- Emission trading has successfully reduced emissions and the costs of achieving those reductions without compromising environmental goals.[36]
- The inclusion of a broad and diverse set of emission sources under the cap will lower costs, achieve the environmental objective, and accelerate innovation, making cap-and-trade particularly applicable for reducing greenhouse gas emissions.
- A common set of rules and guidelines are required for monitoring and reporting emissions to ensure market transparency and compliance.
- Rigorous monitoring of emissions is critical to making the probability of detecting non-compliance high. Penalties for non-compliance must be strict and sure.
- There are some elements of a multi-jurisdictional cap-and-trade program that must be the same between implementing jurisdictions; these include certain elements of measurement and reporting of emissions, the schedule for distributing allowances to covered entities or facilities, compliance and reconciliation periods, the use of banking and/or borrowing, the acceptance of offsets and allowances from other trading programs, and compliance and enforcement.
- Other elements of a multi-jurisdictional cap-and-trade program do not need to be the same across implementing jurisdictions: it is not critical that the states and provinces allocate allowances within their jurisdictions in the same manner and jurisdictions may include varying levels of auction in their allowance distribution.

2.4. WCI Design Principles

To attain the Western Climate Initiative's regional GHG reduction goal, the WCI Partner jurisdictions committed to designing a cap-and-trade system that:

- Is equitable, administratively simple for government and private participants, minimizes administrative costs, and has a clear compliance path;
- Maximizes total benefits in jurisdictions throughout the region, including reducing air pollutants, diversifying energy sources, and advancing economic, environmental, and public health objectives, while also avoiding localized or disproportionate environmental or economic impacts;
- Requires all reductions to be real, verifiable, enforceable, and permanent, and surplus/additional;
- Stimulates investment, especially in low carbon technologies, and rewards innovations that will lead to long-term, permanent greenhouse gas reductions;
- Covers as many sources as is practical, while encouraging pollution reductions beyond the capped sources and sectors;

[36] When compared to a policy that would have forced scrubbing to achieve the same level of emissions (required for acid rain mitigation), cost savings of the Acid Rain Program were estimated to be $1.6 billion per year in 1995 dollars. *See* Carlson, C. P., D. Burtraw, M. Cropper, and K. L. Palmer. 2000. Sulfur dioxide control by electric utilities. *Journal of Political Economy* 108 (6):1292-1326.

- Provides appropriate recognition and incentives for early emissions reductions;
- Assures a transparent and robust accounting system that will measure and report emissions rigorously and consistently across all sectors and throughout the region;
- Minimizes the potential for leakage; and
- Facilitates linkage to similarly rigorous regional and international greenhouse gases reduction markets and encourages other states, provinces, and countries to join the market.

2.5. Statement on the Overall Policy Design

The WCI Partners are proposing the most expansive cap-and-trade program in U.S. history, covering more sectors than the EU ETS in a broad, multi-sector greenhouse gas cap-and-trade program. As designed, the program will cover approximately 90 percent of the region's GHG emissions. Recognizing that federal mandatory GHG reduction programs might emerge in the United States and/or Canada, the WCI Partner jurisdictions have designed a program that can stand alone, provide a model for, be integrated into, or be implemented in conjunction with future federal programs. The WCI Partner jurisdictions intend to promote and influence federal GHG emission reduction programs that are consistent with the WCI cap-and-trade design principles and to ensure those programs translate into absolute GHG reductions. In the event WCI issues allowances before a federal program in Canada or the United States, the WCI Partner jurisdictions will work to ensure, but cannot guarantee, that those allowances are fully recognized and valued in the operation of a federal program.

3. Process to Date and Continued Work

3.1. Setting the Regional Goal

The WCI Partner jurisdictions issued their regional GHG reduction goal on August 22, 2007 to achieve an aggregate reduction of 15 percent below 2005 levels by 2020.[37] The WCI regional goal is consistent with the state and provincial goals of the WCI Partner jurisdictions and does not replace the existing goals of the individual WCI Partner jurisdictions. Several metrics were used to establish this goal, including:

- The aggregation of GHG emissions and emissions goals of the WCI Partner jurisdictions;
- Currently available state and provincial emissions inventories, including gross emissions estimates, across all sectors, for the six GHGs reported to the United Nations Framework Convention on Climate Change by the U.S. Environmental Protection Agency in the US Greenhouse Gas Inventory and by Environment Canada in the Canada National Inventory Report: carbon dioxide (CO_2), methane (CH_4), nitrous

[37] *See* Western Climate Initiative Statement of Regional Goal. Available online at www.westernclimateinitiative.org/ewebeditpro/items/O104F13006.pdf.

oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6); and[38]

- Where available, consumption-based (or "load-based") emissions estimates for the electricity sector, reflecting the emissions associated with generating the electricity delivered to consumers in each state or province regardless of whether the electricity was generated in state/province or out of state/province.

The WCI Partner jurisdictions also committed to doing their share to reduce regional GHG emissions sufficiently over the long term to significantly lower the risk of dangerous threats to the climate. Current science suggests that this will require worldwide reductions in carbon dioxide emissions of 50 to 85 percent below 2000 levels by 2050.[39]

3.2. The Work of the Subcommittees

Five WCI subcommittees were formed to work toward a cap-and-trade program design that all WCI Partner jurisdictions can embrace and recommend for implementation in their jurisdiction. The five subcommittees and their purposes were:

- Reporting. Recommend the GHG emissions reporting system needed to support the WCI cap-and-trade program.
- Electricity. Recommend the point of regulation for the electricity sector.
- Scope. Recommend what other sectors and sources to include in the cap-and-trade program in addition to the electricity sector and the appropriate point of regulation for each sector.
- Allocations. Recommend how to apportion emissions allowances among the WCI Partner jurisdictions and how WCI Partner jurisdictions should distribute allowances to achieve jurisdictional and regional goals.
- Offsets. Recommend whether and how emissions offsets should be included.

Each subcommittee was chaired by a representative of one of the WCI Partner jurisdictions, composed of staff from WCI Partner and observer jurisdictions, and had support from various consultants and advisors working under contract to the Western Governors' Association. During the development of the draft program design, the subcommittees met regularly by conference call and at times held face-to-face meetings. All subcommittees incorporated stakeholder involvement and feedback to help design the program.

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[38] *See* EPA. 2008. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006*. Available online at: www.epa.gov/climatechange/emissions/usinventoryreport.html. Environment Canada. 2008. *National Inventory Report 1990-2006: Greenhouse Gas Sources and Sinks in Canada – The Canadian Government's Submission to the UN Framework Convention on Climate Change*. Available at: www.ec.gc.ca/pdb/ghg/inventory_e.cfm.

[39] IPCC. 2007. *Climate Change 2007: Synthesis Report; Summary for Policymakers.* Available online at: www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

In addition to these five subcommittees, an Economic Modeling Team (EMT) was established to prepare the work plan for, select, and oversee the work of a contractor to evaluate the potential economic impact of the cap-and-trade program. This effort is on-going and includes outreach to stakeholders to receive advice and data to bolster the assumptions and inputs that underlie the modeling exercise.

3.3. Stakeholder Process for the Design Recommendations

Throughout the WCI cap-and-trade design process, there have been many opportunities and methods for stakeholder input on a regional level. These opportunities supplemented and did not replace extensive stakeholder consultations at the state and provincial level. In addition, states and provinces have and are continuing to conduct extensive stakeholder consultations. The decisions reached throughout the design process have benefited greatly from stakeholder input.

The regional stakeholder process for the Design Recommendations included a number of important avenues for the sharing of information and input. Among them:

- Stakeholder Workshops. Five regional stakeholder workshops were held to allow face-to-face interaction between stakeholders and WCI Partner jurisdictions and staff. Three of these workshops were comprehensive and included subcommittee-specific sessions to explore the subject areas within each subcommittee's purview. The other two addressed offsets and electricity point-of-regulation specifically. The workshops are noted in the table below.
- Stakeholder Conference Calls. Over the course of the design effort, the WCI Partner jurisdictions held regional stakeholder conference calls to update stakeholders on progress toward a cap-and-trade design and to answer stakeholder questions.
- Review and Comment in Writing. At regular intervals throughout the process, the WCI Partner jurisdictions and the subcommittees released written work for review and comment by stakeholders.
- The Website.[40] The WCI website served as a repository for information on the design effort. The website included information on upcoming stakeholder calls and workshops, and also provided a way to submit comments to the WCI Partner jurisdictions.

The table below details the various stakeholder events along with the work products released by WCI leading up to the release of the Design Recommendations accompanying this document. As noted above, the activities outlined in the table are in addition to the individual outreach to stakeholders conducted by each individual WCI Partner jurisdiction.

[40] The Western Climate Initiative website can be accessed at www.westernclimateinitiative.org.

Part 1, Cap-and-Trade Program Design, summarizes stakeholder input on the cap-and-trade program design elements.

Table 1: The WCI Stakeholder Input Process Through September 2008

Activity	Date
Periodic Stakeholder Conference Calls	Summer-Fall 2007
Subcommittee Options Papers released for public review and comment[41]	Early January 2008
Stakeholder Workshop, Portland, OR[42]	January 10, 2008
Initial Draft Scope Recommendations and Electricity Point of Regulation Recommendations released for public review and comment	February 3, 2008
Stakeholder Conference Calls with Scope and Electricity Subcommittees	February 11, 2008
Scope of Work for Economic Analysis[43] released for public review and comment	March 3, 2008
Initial Draft Design Recommendations released[44] for public review and comment • Scope and Electricity • Offsets, Allocations, and Reporting	 March 5, 2008 April 3, 2008
Stakeholder Conference Calls with Subcommittees	Week of March 11, 2008
Offsets Workshop in Vancouver, BC[45]	March 26, 2008
Stakeholder Conference Call with Economic Modeling Team[46]	March 28, 2008
Stakeholder Conference Call with Economic Modeling Team	April 14, 2008
Stakeholder Conference Call with Economic Modeling Team	May 12, 2008
Consolidated WCI Draft Recommendations released[47] for public review and comment	May 16, 2008
Stakeholder Workshop in Salt Lake City, UT to discuss draft subcommittee recommendations[48]	May 21, 2008

[41] Allocation, Electricity, Offsets, Reporting, and Scope Options Papers are available online at www.westernclimateinitiative.org/WCI_Documents.cfm.

[42] Public workshop presentations are available online at www.westernclimateinitiative.org/WCI_Meetings_Events.cfm.

[43] Stakeholder involvement opportunities for the economic modeling effort are available online at www.westernclimateinitiative.org/Economic_Analysis.cfm.

[44] Draft Design Recommendations are available online at www.westernclimateinitiative.org/WCI_Documents.cfm.

[45] Offsets workshop materials are available online at www.westernclimateinitiative.org/WCI_Meetings_Events.cfm.

[46] Materials from the Economic Modeling Team's conference calls are available online at www.westernclimateinitiative.org/Economic_Analysis.cfm

[47] The Consolidated Draft Recommendations are available online at www.westernclimateinitiative.org/ewebeditpro/items/O104F17390.PDF.

Activity	Date
Stakeholder Conference Call with Economic Modeling Team	June 9, 2008
Electricity Subcommittee Meeting on Technical Issues Related to First Jurisdictional Deliverer in Portland, OR	July 17, 2008
Stakeholder Conference Call with Economic Modeling Team	July 21, 2008
Draft Program Design Recommendations[49] released for public review and comment	July 23, 2008
Stakeholder Workshop in San Diego, CA to Discuss Draft Design Recommendations	July 29, 2008
Final Design Recommendations to be Delivered to Governors and Premiers	September 23, 2008

3.4. Continued Work

The Design Recommendations released along with this document represent the final high-level design elements for the cap-and-trade program. Many of the design aspects will require further development. The WCI Partner jurisdictions' next task will be to develop a work plan that identifies and prioritizes those items and develop a schedule for their completion. The work plan will be shared with stakeholders once it is complete. The work plan will include opportunities for stakeholders to advise, comment, and participate in the further development of the cap-and-trade program.

4. Economic Analysis

4.1. Insights from Prior Analyses of Climate Policies

The potential economic impacts of climate protection policies have been the subject of considerable analysis and debate for more than a decade. Recognizing that significant reductions in GHG emissions are required globally to prevent the most serious climate change impacts, studies have examined how to design climate policies to minimize economic impacts. One of the important recommendations from the recent work has been that market-based policies, such as cap-and-trade programs, can reduce emissions at a lower cost than can be achieved through traditional regulation. This conclusion is grounded in economic theory as well as empirical evidence from past cap-and-trade program experience. Specifically, comprehensive carbon pricing through a cap-and-trade program takes advantage of the diverse opportunities to reduce emissions throughout the economy and provides incentives for continued innovation.

Recent efforts, therefore, move past the basic question of whether to use market-based policies, such as a cap-and-trade program, and onto the question of how to best design a

[48] Meeting agenda and presentations are available online at www.westernclimateinitiative.org/WCI_Meetings_Events.cfm.

[49] The Draft Design Recommendations are available online at www.westernclimateinitiative.org/ewebeditpro/items/O104F18808.PDF.

cap-and-trade program. To inform the design of this program, the WCI Partner jurisdictions examined program guidance,[50] U.S. analyses of the Lieberman-Warner Climate Security Act and California AB32, and Canadian analyses by Environment Canada and British Columbia. These analyses consistently demonstrated that several program design features can have an important impact on compliance costs:

- Flexibility in the timing of GHG reductions reduces the overall costs of cumulative GHG abatement. Multiple-year compliance periods and allowance banking have been identified as effective approaches for providing flexibility.
- Allowing offset credits to be used for program compliance can lower the compliance cost of meeting emission reduction targets.
- A broad scope that covers more sectors in a cap-and-trade program can lower compliance costs by providing maximum opportunities to pursue low-cost emission reductions.

Studies have also shown that innovation in advanced, low-carbon technologies (such as carbon capture and storage for electric power generation) can have a substantial impact on compliance costs, particularly after 2020. Consequently, providing incentives for technology development and demonstration is important for minimizing costs.

Complementary policies have also been examined as a means for addressing market barriers that would otherwise hinder the exploitation of low-cost GHG emission reduction opportunities (e.g., via improved energy efficiency). Thus, complementary policies can lower the overall cost of reducing GHG emissions. Analysts differ in their treatment of complementary policies, however. Some analysts allow for cost savings to be realized from complementary policies such as building codes, appliance standards, vehicle standards, and energy efficiency programs. A recent McKinsey analysis of GHG abatement costs in the United States provides one view of the potential for gains from complementary policies.[51] McKinsey found significant opportunities to reduce GHG emissions while also saving money through investments in energy efficiency. The existence of opportunities to reduce GHG emissions at "negative cost" even in the absence of a cap-and-trade program suggests that complementary policies, such as energy efficiency standards and programs, can lead households and businesses to exploit such opportunities.

Other analysts start with the presumption that markets function efficiently, so that there is little or no opportunity for these complementary policies to lead to overall savings.[52] Under these assumptions, any climate policies must impose economic costs. This divergence of views on the potential to realize savings from complementary policies is one of the primary

[50] See, for example, U.S. Environmental Protection Agency, *A Guide to Designing a Cap and Trade Program for Pollution Control*, Office of Air and Radiation, Washington, D.C., EPA430-B-03-002, June 2003, available online at: www.epa.gov/airmarkt/resource/cap-trade-resource.html.

[51] Creyts, J., et al. (McKinsey). 2007.

[52] See generally Stavins, Robert et al. 2007. "Too Good to Be True? An Examination of Three Economic Assessments of California Climate Change Policy." AEI-Brookings Joint Center Working Paper No. 07-01.

factors that causes some studies to show a small net savings to the economy from climate policies, while others show a small net cost. What is important to recognize is that in virtually all analyses, well defined cap-and-trade programs with the cost-saving features listed above have been found to be consistent with continued robust economic growth in the U.S. and Canada. By coupling a cap-and-trade program with complementary policies, the WCI Partners expect to use the market to capture cost-effective reduction opportunities and drive innovation, while targeted complementary policies address barriers that might otherwise limit the adoption of least-cost emission reductions.

4.2. WCI Economic Analysis

In order to examine the economic impacts of WCI program design options, WCI Partner jurisdictions contracted with ICF International and Systematic Solutions, Inc. (SSI) to perform economic analyses using ENERGY 2020,[53] a multi-region, multi-sector energy model. The workings of the model and the inputs to the model were the subject of multiple stakeholder conference calls and were discussed at two WCI stakeholder workshops. Appendix B presents the results of the analysis.

To help inform the program design process, the analysis examined the implications of key design decisions, including: program scope, allowance banking, and the use of offsets. Due to time and resource constraints, the modeling was limited to the eight WCI Partner jurisdictions in the Western Electric Coordinating Council (WECC) area, thereby excluding from the analysis three Canadian provinces, Manitoba, Quebec, and Ontario. Future analyses are planned that will integrate these provinces so that a full assessment of the WCI Partner jurisdictions can be performed.

The results of the analysis provided the following insights into the program design:[54]

- Complementary Policies: The analysis demonstrated that energy efficiency programs, vehicle emissions standards, and programs to reduce vehicle miles traveled (VMT) are important for achieving emission reductions. The manner in which these policies are represented in ENERGY 2020 results in overall savings being realized from these policies. Resources from the cap-and-trade program (e.g., from the auctioning of emission allowances) can fund these complementary programs.
- Banking: The analysis demonstrated that the ability to bank allowances is critical for reducing compliance costs. Throughout all the cases examined, emission allowances

[53] More about the ENERGY 2020 model can be found online at www.energy2020.com/energy.htm.

[54] Like all analyses of climate policies, this analysis relies on a model to explore alternative policy choices and provide insights about how the economy might respond to different types and forms of regulation. The insights derived from the studies do not depend on perfectly accurate projections of the future or precise estimates of economic variables. Rather, modeling studies assess the relative impacts of policy alternatives, to estimate the likely economic effects of policies and to identify preferred policy choices. For a review of how economic models can be used in policymaking, see: Peace, Janet and John Weyant. 2008. "Insights Not Numbers: The Appropriate Use of Economic Models." White Paper prepared for the Pew Center on Global Climate Change, available at http://www.pewclimate.org/white-paper/economic-models-are-insights-not-numbers

were estimated to be banked in early years when allowance prices were below $10/metric ton, and used when allowance prices rose in later years.

- Offsets: The analysis demonstrated that under certain circumstances, offsets provide an effective mechanism for limiting compliance costs. In the analysis performed to date, offsets were assumed to be available at $20/metric ton. As allowance prices were estimated to rise to this level, offsets were estimated to be used in combination with allowance banking to reduce compliance costs.

Overall, the analysis found that the WCI Partner jurisdictions can meet the regional goal of reducing emissions to 15 percent below 2005 levels by 2020 with a small overall savings due to reduced energy expenditures exceeding the direct costs of GHG emission reductions.[55] The savings are focused primarily in the residential and commercial sectors, where energy efficiency programs and vehicle standards are expected to have the most significant impacts. Energy-intensive industrial sectors are estimated to have small net costs overall (less than 0.5 percent of output). When offsets are included in the analysis, allowance prices are estimated to increase from $6/metric ton in 2015 to about $24/metric ton in 2020. If offsets are not included, or if they cost substantially more than $20/metric ton, then the allowance price is estimated to be higher. To date the analysis has included a simplified representation of the potential supply of offsets. Additional work is being considered to develop a better estimate of the supply of offsets under various offset program policies.

The analysis examined the sensitivity of the results to various assumptions. The analysis suggests a net savings whether future energy prices are higher or lower than in the Reference Case. It also suggests a net savings with higher electricity power generation costs. If the program scope were narrowed to exclude transportation fuels and residential and commercial fuels, the overall impacts would be similar, but allowance prices may be expected to be higher because the program is focused on a smaller group of sources. If the program causes a substantial increase in natural gas prices, then the overall impact is estimated to be a small net cost to the economy. However, the program is not expected to lead to increases in natural gas prices. As discussed with stakeholders during the WCI economic analysis conference calls, it is worthwhile to explore many additional sensitivities to better understand the implications of various analytical assumptions and inputs. However, time and resources did not allow additional sensitivities to be examined for this report.

These WCI modeling results are generally consistent with the findings of prior modeling studies of both U.S. and Canadian programs. Offsets and allowance banking provide compliance flexibility that reduces allowance prices. The analysis suggests that offsets are particularly important during the years approaching 2020, but may play a minor role in the early years of the program when allowance prices are expected to be less than $10/metric ton. The overall net savings that are found are consistent with studies that assume that complementary policies, such as energy efficiency programs and vehicle standards, can

[55] Reduced energy expenditures are caused by improved energy efficiency.

result in economic savings. While the overall costs and savings from emission reductions and reduced fuel expenditures are small, potential impacts on specific energy-intensive industrial sectors warrant additional examination. In particular, the results reinforce the need to consider strategies for mitigating economic impacts on industries facing competition from facilities that are not included in climate policies.

In considering the results of the WCI analysis, it is worth highlighting several important assumptions:

- It is assumed that no new nuclear power or hydropower generation capacity will be built prior to 2020. Therefore, the analysis does not include any increase in this power as a result of the cap-and-trade program.
- It is assumed that no carbon capture and storage for electric power generation will be built prior to 2020. Consequently, the analysis does not include the benefits of this carbon-sequestering technology.
- It is assumed that no new coal-fired power plants are built in the WECC states and provinces through 2020 beyond those that are already planned.
- It is assumed that plug-in hybrid electric vehicles will not be produced in any significant quantity prior to 2020. Thus, the model does not include an increase in this low carbon transportation alternative as a result of the cap-and-trade program.
- For the U.S. states, the requirements of the Energy Independence and Security Act (EISA) are assumed to be part of the Reference Case against which the cap-and-trade program is evaluated. For the Canadian provinces, lighting, equipment, and appliance standards as set out by the Canadian Standards Association as well as the federal "ecoENERGY" Renewable Fuels Strategy are included in the Reference Case.

Finally, the analysis does not examine the potential macroeconomic impacts of the costs and savings estimated with ENERGY 2020. The WCI Partner jurisdictions are planning to continue the analysis so that macroeconomic impacts, such as income, employment, and output, can be assessed. Once completed, the macroeconomic impacts can be compared to previous studies of cap-and-trade programs considered in the United State and Canada.

4.3. Benefits of Cap-and-Trade Not Fully Represented in Economic Models

Economic models are by necessity simplified representations of the real-world economy, including the characteristics of and relationships among the households and firms that constitute the economy. The simplified nature of these models means that they may not fully capture all of the advantages of market-based climate policies, such as cap-and-trade programs, compared to prescriptive standards (i.e. command-and-control or direction regulation). The aspects of the real-world economy that are imperfectly represented in models are described below along with the implications for how well modeling studies capture the true advantages of market-based climate policies.

Heterogeneity: In direct regulation, all facilities in an industry are required to achieve a given level of performance or emission reduction. Modeling tools typically represent the industry as a single "model facility" or as a sector with demand and supply elasticities. In reality, industry is actually heterogeneous with different facilities facing different costs for reducing emissions. An important benefit of cap-and-trade is that it allows the low cost facilities to do more than the high cost facilities—i.e. the market directs the least-cost emissions reductions. The existing modeling tools may not fully capture this benefit of cap-and-trade, thus underestimating the relative cost-effectiveness of cap-and-trade compared to other policies.

Diffuse Behavioral Change: The price signal from a market program such as cap-and-trade will create consumer behavior change throughout the economy that is diffuse and not necessarily captured by existing modeling tools. These behavior changes are responses to persistent price signals that are not reflected in elasticities and are not part of "model facility" engineering cost studies. For example, bottom-up energy models may show that efficient lighting will be installed at a given allowance price, but it may not show that the consumer will also use the lights more efficiently. Existing modeling tools may not fully reflect these effects.

Induced Innovation: The price signal from a market program such as cap-and-trade will induce technological innovation in a way that is not adequately included in models.

Errors in Direct Regulation Cost Estimates: When direct regulations are promulgated, the costs of complying with the regulations will likely be estimated incorrectly, either too high or too low. When a portfolio of direct regulations is being developed, the mix and stringency of the regulations will be incorrectly estimated as a result. If the cost estimates are too high for a regulation, that regulation will not be strict enough. If the cost estimate is too low, that regulation may be too strict. Market programs such as cap-and-trade do not suffer from this problem, as the market sorts out who should do what to achieve the total emission reduction needed. Existing modeling tools presume that the costs of control are known in advance and are correct. Consequently, the benefit of avoiding these cost estimating errors is not captured by the models, thereby under-estimating the benefits of using market programs.

Appendix A: Western Regional Climate Action Initiative Agreement

Note: This agreement was subsequently signed by: Premier Gordon Campbell, British Columbia, Premier Gary Doer, Manitoba, Governor Jon Huntsman, Utah, Governor, Brian Schweitzer, Montana, Premier Jean Charest, Quebec, and Premier Dalton McGuinty, Ontario

Christine O. Gregoire

Theodore R. Kulongoski

Arnold Schwarzenegger

Janet Napolitano

Bill Richardson

WESTERN REGIONAL CLIMATE ACTION INITIATIVE

WHEREAS, western states are experiencing the effects of a hotter, drier climate, including prolonged droughts, excessive heat waves, reduced snow packs, increased snowmelts, decreased spring runoffs, altered precipitation patterns, more severe forest and rangeland fires, widespread forest diseases, and other serious impacts; and

WHEREAS, scientific consensus has developed that increasing emissions of human-caused greenhouse cases (GHGs), including carbon dioxide, methane and other GHGs, that are released into the atmosphere are affecting the Earth's climate; and

WHEREAS, the Western Governors Association (WGA) has declared that climate change could have severe economic and environmental impacts on the Western States in coming decades; and

WHEREAS, the WGA also has declared that action is needed to reduce GHG emissions and that many of these actions can have significant economic and environmental benefits for the Western States, including increased energy efficiency, increased renewable energy generation, improved air quality, cost savings, job growth, increased state revenues, and reduced water pollution; and

WHEREAS, we support the development of national, regional, tribal, state and local programs to reduce GHG emissions; and

WHEREAS, we support national, regional, tribal, state and local level policies on global climate change that are consistent with efforts to develop cost-effective alternative energy sources and more efficient use of energy; and

WHEREAS, we recognize the need for collaboration among states to develop climate change policies that provide consistent approaches to recognize and give credit for actions to reduce GHG emissions; and

WHEREAS, we have already adopted or committed to adopt clean tailpipe standards for passenger vehicles that will result in major reductions in GHG emissions and other pollutants; and

WHEREAS, we support market-based policies to reduce GHG emissions in the most cost-effective manner; and

WHEREAS, we have set goals to significantly reduce GHG emissions from our respective states; and

WHEREAS, we welcome expanding the partners to this initiative to other states, tribes, Canadian provinces and Mexican states and offer monitoring status to any state, tribe or province interested in observing the initiative;

NOW, THEREFORE, we, the undersigned Governors, jointly establish the Western Regional Climate Action Initiative and agree to collaborate in identifying, evaluating and implementing ways to reduce GHG emissions in our states collectively and to achieve related co-benefits. This collaboration shall include, but is not limited to:

- Setting an overall regional goal, within six months of the effective date of this initiative, to reduce emissions from our states collectively, consistent with state-by-state goals;
- Developing, within eighteen months of the effective date of this agreement, a design for a regional market-based multi-sector mechanism, such as a load-based cap and trade program, to achieve the regional GHG reduction goal; and
- Participating in a multi-state GHG registry to enable tracking, management, and crediting for entities that reduce GHG emissions, consistent with state GHG reporting mechanisms and requirements.

In addition, we commit to continue our independent and collaborative efforts to reduce GHG emissions through:

- Promoting the development and use of clean and renewable energy within the region;
- Increasing the efficiency of energy use within our jurisdictions;
- Advocating regional and national climate policies that reflect the needs and interests of western states, tribes and provinces; and
- Identifying measures in our states, tribes and provinces to adapt to the impacts of climate change.

We will direct our staffs and the appropriate state agencies to meet as soon as is practicable to develop a work plan to move forward with this initiative.

DONE, in five (5) duplicate originals, this 26th day of February, 2007, in Washington, D.C.

Governor Christine O. Gregoire
State of Washington

Governor Theodore R. Kulongoski
State of Oregon

Governor Janet Napolitano
State of Arizona

Governor Bill Richardson
State of New Mexico

Governor Arnold Schwarzenegger
State of California

Appendix B: Economic Modeling Results

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Appendix B: Economic Modeling Results

Introduction

This appendix presents data from the economic modeling performed for WCI, including the model inputs and outputs for the cases examined. The focus here is on the data and assumptions used as model inputs and the model outputs. The main body of the Background Document discusses the policy implications of the model results.

This appendix is organized as follows:

- Cases Analyzed: describes the cases presented in this appendix.
- ENERGY 2020: provides a brief technical discussion of the model used.
- Assumptions: lists the primary assumptions used in the model.
- Outputs: defines the model outputs that are presented for the cases.
- Summary Results: provides a brief table of key model outputs.
- Reference Case: presents the results of the Reference Case.
- Cap-and-Trade Policy Cases: presents the results of the cap-and-trade policy cases.
- Sensitivity Cases: presents the results of three sensitivity cases.

As discussed below, additional detail on the ENERGY 2020 model and the model inputs and assumptions used in this analysis are presented in the *Assumptions Book for ENERGY 2020* posted on the WCI website.[1]

Cases Analyzed

This appendix presents three groups of cases. The first group is the Reference Case which reflects expectations in the absence of the WCI policies to reduce greenhouse gas emissions.

The second group is the Cap-and-Trade Policy Cases. These cases examine the primary alternatives for the cap-and-trade program, including whether to allow the use of offsets and whether to have a narrow or broad scope. The narrow scope includes stationary sources (including process emissions) and the electric sector. The broad scope also includes transportation fuels and residential/commercial fuels. The cases presented are:

- broad scope without offsets;
- broad scope with offsets; and
- narrow scope with offsets.

For all three Cap-and-Trade Policy cases, complementary policies are included along with the cap-and-trade program, including clean car standards, programs to reduce vehicle miles traveled, and energy efficiency programs. These complementary policies are defined below.

The third group of cases is the Sensitivity Cases. The purpose of the sensitivity cases is to assess the impacts of various assumptions and inputs on the model results. These assumptions can affect both the Reference Case and the Policy Cases. While a large number of

[1] The WCI website is: www.westernclimateinitiative.org.

assumptions and sensitivities are of interest, this analysis focuses on three sensitivities that were identified as most important by WCI partner jurisdictions and stakeholders.

- High Energy Prices and High Generation Costs: This sensitivity includes both higher energy prices and higher power generation costs as a set of conditions that could occur together in the future. This sensitivity was performed for both the Reference Case and the Policy Case with the broad scope and offsets.
- Low Energy Prices: This sensitivity uses energy prices that are lower than those used in the Reference Case. This sensitivity was performed for both the Reference Case and the Policy Case with the broad scope and offsets.
- High Natural Gas Prices: This sensitivity was designed to examine the impact of higher natural gas prices that may be induced by policies that are undertaken to reduce greenhouse gas emissions. Consequently, this sensitivity was applied to the Policy Case with broad scope and offsets. The results of this Policy Case are compared to the Reference Case with the standard natural gas price assumptions because the presumption is that policies are inducing the natural gas prices to increase.

Additional sensitivity analyses are warranted, and many important and worthwhile issues were identified by stakeholders during the conference calls and workshops that covered this work. However, due to time and resource constraints, additional sensitivities are not included at this time. Future work is anticipated that will enable additional sensitivity analyses to be performed.

ENERGY 2020

ENERGY 2020 was used to perform this analysis. A description of ENERGY 2020 is in the *Assumptions Book for Energy 2020* posted on the WCI website.[2] Additional documentation is available on the California Air Resources Board (ARB) website.[3] The following is a brief summary.

ENERGY 2020 is an integrated multi-region energy model that provides all-fuel demand and supply sector simulations. ENERGY 2020 can be linked to a detailed macroeconomic model to determine the economic impacts of energy/environmental policy and the energy and environmental impacts of national economic policy. However, the macroeconomic analysis was not performed for this study.

The model simulates demand by three residential categories (single family, multi-family, and agriculture/rural), over 40 NAICS commercial and industrial categories,[4] and three transportation services (passenger, freight, and off-road). There are approximately six end-uses per category and six technology/mode families per end-use.[5] The technology families

[2] The WCI website is: www.westernclimateinitiative.org.

[3] The posting on the ARB website is at: http://www.arb.ca.gov/cc/scopingplan/economics-sp/models/models.htm.

[4] NAICS is the North America Industrial Classification System which was developed jointly by the U.S., Canada, and Mexico to provide new comparability in statistics about business activity across North America.

[5] End-uses include Process Heat, Space Heating, Water Heating, Other Substitutable, Refrigeration, Lighting, Air Conditioning, Motors, and Other Non-Substitutable (Miscellaneous). Detailed modes include: small auto, large

correspond to six fuels groups (oil, gas, coal, electric, solar and biomass) and 30 detailed fuel products. The transportation sector contains 45 modes including various type of automobile, truck, off-road, bus, train, plane, marine and alternative-fuel vehicles. More end-uses, technologies, and modes can be added as data allow. For all end-uses and fuels, the model is parameterized based on historical, locale-specific data. The load duration curves for electricity demand are dynamically built up from the individual end-uses to capture changing conditions under consumer choice and combined gas/electric programs.

Each energy demand sector includes cogeneration, self-generation, and distributed generation simulation, including mobile-generation, micro-turbines, and fuel-cells. Fuel-switching responses are rigorously determined. The technology families (which can be split, as an option, to portray specific technology dynamics) are aggregates that, within the model, change building shell, economic-process and device efficiency and capital costs as price or other information that the decision makers see, change. ENERGY 2020 utilizes the historical and forecast data developed for each technology family to parameterize and disaggregate the model.

The supply portion of the model includes endogenous detailed electric supply simulation of capacity expansion/construction, rates/prices, load shape variation due to weather, and changes in regulation.[6] The model dispatches plants according to the specified rules whether they are optimal or heuristic and simulates transmission constraints when determining dispatch. A dispatch routine selects critical hours along seasonal load duration curves as a way to determine system generation. Peak and base hydro usage is explicitly modeled to capture hydro-plant impacts on the electric system.

ENERGY 2020 supply sectors include electricity, oil, natural gas, refined petroleum products, ethanol, land-fill gas, and coal supply. Energy used in primary production and emissions associated with primary production and its distribution is included in the model. The supply sectors included in a particular implementation of ENERGY 2020 will depend on the characteristics of the area being simulated and the problem being addressed. If the full supply sector is not needed, then a simplified simulation determines delivered-product prices.

ENERGY 2020 includes pollution accounting for both combustion (by fuel, end-use, and sector) and non-combustion, and non-energy (by economic activity) for SO_2, NO_2, N_2O, CO, CO_2, CH_4, PMT, $PM_{2.5}$, PM_5, PM_{10}, VOC, CF_4, C_2F_6, SF_6, and HFC at the state and provincial level by economic sector.

Assumptions

This section presents an overview of the major assumptions used in the modeling analysis. The *Assumptions Book for ENERGY 2020* presents a detailed list of the model inputs, including links to the data sources used to assemble the input data.

auto, light truck, medium-weight truck, heavy-weight truck, bus, freight train, commuter train, airplane, and marine. Each mode type can be characterized by gasoline, diesel, electric, ethanol, NG, propane, fuel-cell, or hybrid vehicles.

[6] ENERGY 2020 includes a complete, but aggregate representation of the electric transmission system.

- Geographic Coverage: This phase of the analysis covers the area of the Western Electricity Coordinating Council (WECC), which includes eight WCI partners: British Columbia, Washington, Oregon, California, Arizona, New Mexico, Utah, and Montana. By covering the entire WECC, the impacts of the WCI programs and policies on electricity generation in the non-WCI WECC states and provinces can be examined. Future analyses are planned that will incorporate the WCI partners that are not in the WECC, including Manitoba, Ontario, and Quebec.
- Sectors and Sources: This phase of the analysis includes energy use in all sectors, as well as most industrial process emissions. Landfill methane emissions and non-energy agriculture emissions are included in the total emissions estimates, but emission reductions are not estimated for these sources.[7] The analysis is based on gross emissions, so that forestry emissions and sinks are excluded.
- WCI Population and GDP Forecast: The model is driven by forecasts provided as input that include population growth and economic growth by detailed sector. Table B-1 shows the population growth forecast and Table B-2 shows the economic growth forecast.

Table B-1: Population Forecast for Eight WCI Partners, Selected Years (Millions)

Jurisdiction	2006	2010	2015	2020	Annual Growth
Arizona	6.2	7.0	7.9	8.8	2.5%
British Columbia	4.3	4.5	4.7	4.9	0.9%
California	37.4	39.1	41.5	44.1	1.2%
Montana	0.9	1.0	1.1	1.2	1.6%
New Mexico	2.0	2.2	2.3	2.5	1.8%
Oregon	3.7	3.9	4.1	4.3	1.1%
Utah	2.6	2.7	3.0	3.2	1.6%
Washington	6.4	6.8	7.3	7.7	1.4%
WCI	**63.5**	**67.2**	**71.9**	**76.7**	**1.4%**
Source: Assumptions Book for ENERGY 2020					

[7] Examples of non-energy agriculture emissions are methane emissions from livestock, carbon and N_2O emissions from agricultural soils, and methane emissions from livestock manure management.

Table B-2: Regional Gross Product Forecast for Eight WCI Partners, Selected Years (Billions of 2007 US dollars)

Jurisdiction	2006	2010	2015	2020	Annual Growth
Arizona	237	271	322	363	3.1%
British Columbia	266	294	326	358	2.1%
California	1,800	2,066	2,458	2,782	3.2%
Montana	33	37	42	47	2.5%
New Mexico	77	87	103	117	3.0%
Oregon	159	186	227	259	3.6%
Utah	98	111	129	146	2.9%
Washington	302	345	410	462	3.1%
WCI	**2,972**	**3,396**	**4,018**	**4,534**	**3.1%**
Source: Assumptions Book for ENERGY 2020					

- Emission Reduction Options: The model simulates decisions by energy users for each end use, including: fuel choice; investment in end use efficiency (e.g., by purchasing devices that are more efficient than the minimum required by standards); and end use utilization (how much the device is used). End-use specific choices are simulated as needed, such as mode choice for freight movement and passenger transportation. Choices are simulated based on costs (increased capital costs versus the value of fuel saved) as well as non-price attributes (convenience, acceptance of the technology). Past purchasing behavior is used to calibrate the non-price choice parameters for each end use.
- Energy Independence and Security Act of 2007 (EISA): The Reference Case, Policy Cases, and Sensitivity Cases include the requirements in the EISA, including the CAFÉ standards, appliance and lighting energy efficiency standards, and the renewable fuels standard (RFS). These requirements are assumed to be implemented fully in the WCI partner jurisdictions in the United States. For British Columbia and other Canadian provinces, lighting, equipment and appliance standards as set out by the Canadian Standards Association[8] as well as federal "ecoENERGY" Renewable Fuels Strategy[9] are incorporated.
- Renewable Portfolio Standards: All cases incorporate the individual Partner's already-adopted Renewable Portfolio Standards (RPS). See Appendix I of the *Assumptions Book for ENERGY 2020* for details.

[8] http://www.oee.nrcan.gc.ca/regulations/home_page.cfm

[9] This strategy requires 5% average renewable content based on the gasoline pool that is produced or imported, starting in 2010, and 2% average renewable content in diesel fuel and heating oil (distillate) by 2012. The Canada Gazette indicates that the 2% renewable content in diesel fuel and heating oil is equivalent to 5% renewable content in on-road diesel use. (See http://canadagazette.gc.ca/partI/2006/20061230/html/notice-e.html#i3)

- WCI Fuel Prices: The model is also driven by forecasts of fuel prices (oil, coal, natural gas). The model calculates electricity prices internally. Table B-3 shows the fuel price forecast used in the Reference Case. This forecast is taken from the Energy Information Agency's Annual Energy Outlook 2008 high price series. State- and province-specific prices are derived in the model from the prices shown in this table.

Table B-3: Fuel Price Forecast

	2006	2010	2015	2020
World Oil Price (2007 US$/barrel)	64.32	76.22	86.92	97.90
Natural Gas Wellhead Price (2007 US$/mmBtu)	6.93	7.50	7.13	7.29
Coal Prices (2007 US$/ton)	25.33	26.91	24.78	24.29
Source: EIA Annual Energy Outlook 2008 high price series.				

- First Jurisdictional Deliverer: All cases incorporate a proxy to represent First Jurisdictional Deliverer. Consequently, emissions from electricity imported into the WCI partner jurisdictions from outside the WCI partner jurisdictions are included in the analysis.
- Allowance Banking: The model enables allowances to be banked when allowance prices are low, and for allowances to be used from the bank when allowance prices are high. Attachment 1 discusses the parameters used to model allowance banking.
- Coal Plants: The cases allow no new coal plants to be built by 2020 in the WECC beyond those already planned and committed. See Appendix F of the *Assumptions Book for ENERGY 2020* for the list of coal plants that are assumed to be planned and committed.
- Nuclear Plants: The cases assume no new nuclear plants to be built by 2020 in the WECC.
- Carbon capture and storage: Carbon capture and storage is assumed not feasible for electric power generation through 2020.
- Hydropower: The cases assume no new hydropower capacity built in the WECC by 2020.
- Plug-in hybrids: The cases assume that plug-in hybrid and electric vehicles are not available in significant numbers through 2020.
- Electrical Generation Costs: The modeling effort relies on estimates of power generation capital costs, operating costs, and heat rates developed for a recent study for the California Public utilities Commission (see Table B-4).
- Macroeconomic estimates: This phase of the analysis does not include macroeconomic analysis.

Table B-4: Summary of Power Generation Cost Inputs

Technology	Total Capital Costs $/kW	Fixed O&M ($/kW-yr)	Variable O&M ($/MWh)	Capacity Factor	Nominal Heat Rate
Biogas	$2,623	107.5	0.01	85%	11,566
Biomass	$3,836	50.18	2.96	85%	15,509
Geothermal	$3,575	154.92	-	90%	-
Hydro - Small	$2,530	13.14	3.3	50%	-
Solar - Thermal	$2,840	49.63	-	40%	-
Wind	$1,983	28.51	-	37%	-
Coal ST	$2,671	25.91	4.32	85%	8,844
Coal IGCC	$3,087	36.36	2.75	85%	8,309
Coal IGCC with CCS	$5,127	42.82	4.18	85%	9,713
Gas CCCT	$878	11.04	2.4	90%	6,917
Gas CT	$794	11.4	3.36	5%	10,807
Hydro - Large	$2,530	13.14	3.3	50%	-
Nuclear	$4,999	63.88	0.47	85%	10,400
<5MW CHP	$1,952	11.04	2.4	40.5%	9,700
>5MW CHP	$1,259	11.04	2.4	85%	9,220

Cost Basis Year = 2005. All estimates are 2008 U.S. dollars.
Source: E3 GHG Calculator v2b, tab "Gen Cost". Available at:
http://www.ethree.com/GHG/GHG%20Calculator%20v2b.zip

Outputs

The model results include estimates of energy use, GHG emissions, electricity generation, fuel prices, and costs. The following are brief explanations of the model results that are shown for the cases analyzed.

- Greenhouse Gas (GHG) Emissions: GHG emissions are presented in millions of metric tons of carbon dioxide equivalent ($MMTCO_2e$). Emissions for the eight WCI partner jurisdictions included in the analysis are presented by major sector.
- Compliance Summary: The Compliance Summary shows how GHG emissions are reduced to achieve the WCI partners' regional emissions goal of a 15% reduction from 2005 levels by 2020. The Compliance Summary shows a Compliance Total, which is the calculated emissions minus offsets used and adjusted for any allowances that are banked or that are used from the bank. The running total of emission allowances banked is also reported. The Compliance Total also considers changes in emissions in the non-WCI WECC power sector. The WCI cap-and-trade policies and complementary policies will affect GHG emissions from power generated in the non-WCI WECC states and provinces.

The change in these emissions are also included in the Compliance Total. To make this calculation, emissions associated with power imported into the WCI jurisdictions are estimated at 70 million tons per year. This estimate is preliminary, and is based on an assessment of recent power flows and emissions factors. Given the uncertainty in the estimate of these emissions, as well as the imperfect manner in which the First Jurisdictional Deliverer (FJD) policy is represented in the model, the reduction in emissions from the non-WCI WECC power sector counted toward the Compliance Total is limited to no more than 45 million tons in any year. Using this limit, the potential emission reduction from the non-WCI WECC power sector may be underestimated, thereby making the model evaluate a more stringent program than may be required in some cases. The Compliance Total is compared to 2006 emissions calculated in the model to estimate the emission reduction. In all the cases presented below, the compliance total shows approximately a 15% reduction in total economy wide emissions in 2020 relative to 2006. As discussed above, the estimates include only the eight WCI partner jurisdictions in the WECC.

- Total Energy Use: Total energy use is reported by fuel type and by major sector in units of TBtu/year.
- Electric Sector: Outputs for the electric sector include:
    - Generation Capacity in units of megaWatts (MW) by generation type. Note that estimated generation capacity grows due to capacity additions, but capacity retirement is not calculated. Consequently, generation capacity does not decline in the model outputs.
    - Generation Output in units of gigaWatt-hours per year (GWh/year) by generation type. The generation output is for the eight WCI partner jurisdictions in the WECC.
    - Electricity Sales in units of GWh/year, including electricity imports into the eight WCI partner jurisdictions in the WECC.
- Transportation Sector: Outputs for the transportation sector include vehicle miles traveled for passenger and freight vehicles, as well as miles traveled per passenger. The fleet average efficiency is reported for four vehicle types in miles per gallon.
- Fuel Prices: Fuel prices are reported for electricity, natural gas, coal, fuel oil, LPG, gasoline, and diesel in 2007 dollars per million Btu (2007 $/mmBtu). The prices include the forecasted energy prices (presented in Table B-3 above for the reference case and other tables below for the sensitivity cases) as well as the costs of delivering the fuels to market. The prices reported for the cap-and-trade policy cases also include the calculated allowance price, reflecting the appropriate carbon content of the fuel.
- Costs and Savings: Costs and savings are reported in millions of 2007 dollars per year ($M/Yr). Fuel Expenditures are reported by major sector, showing changes in expenditures from the Reference Case. These estimates of fuels expenditures do not include the value of the calculated allowance price, so a separate table of total allowance value is presented (equal to emissions times the allowance price). The allowance values reported by sector do not consider that the full allowance value may not be passed

through to consumers. Consequently, the allowance value by sector is reported as "potential" allowance value, recognizing that a portion of the allowance value may be borne by producers and not passed through to consumers. Total Costs are also reported by major sector, which are the sum of changes in fuel expenditures and changes in investment costs. Investment costs increase as more efficient devices, buildings, and processes are purchased in response to the limit on GHG emissions. The investment costs are annualized using a 5% real discount rate over the life of the equipment. The annualize costs are counted each year over the life of the equipment. The estimates of Total Costs include both the change in fuel expenditures and the change in investment costs. As shown in the tables below, the fuel expenditure savings typically offset most or all of the increased investment costs.

Results are shown only for the total of the eight WCI partners included in the analysis. State and province specific results are not included.

Reference Case

This section presents the results of the Reference Case. This case represents the future through 2020 in the absence of the WCI cap-and-trade program and related complementary GHG emission reduction policies. Table B-5 through Table B-10 show model outputs for:

- GHG emissions;
- energy use;
- electric sector results;
- transport sector results;
- fuel prices; and
- fuel expenditures.

Each table shows total results for the eight WCI Partners in the WECC. The three Canadian provinces not included in this analysis (Manitoba, Quebec, and Ontario) will be included in future modeling efforts.

Each table shows results for 2006 (the first year simulated by ENERGY 2020), 2010, 2015, and 2020. The growth rate reported for 2006-2020 is the average annual rate of exponential growth between the 2006 level and the 2020 level.

Table B-5: Reference Case Greenhouse Gas Emissions: Eight WCI Partners

GHG Emissions *(MMTCO2E)*	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Residential	49.7	53.7	58.4	63.1	1.7%
Commercial	29.3	30.5	30.7	31.8	0.6%
Energy Intensive Industry	176.8	174.5	181.5	191.0	0.6%
Other Industry	29.8	30.3	30.5	31.0	0.3%
Passenger Transport	290.8	299.4	303.9	294.0	0.1%
Freight Transport	93.0	89.6	89.9	91.7	-0.1%
Power Sector	176.6	166.8	160.0	176.9	0.0%
Waste & Wastewater	25.6	29.1	34.2	38.4	2.9%
Agriculture (non-energy)	59.9	62.1	67.5	74.9	1.6%
Total	**931.6**	**936.1**	**956.6**	**992.8**	**0.5%**

Table B-6: Reference Case Energy Use: Eight WCI Partners

Total Energy Use *(TBtu/year)*	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Aviation Fuel	609	637	683	725	1.3%
Biomass	443	429	453	493	0.8%
Coal	1,185	1,215	1,204	1,259	0.4%
Diesel	1,091	1,051	1,032	1,025	-0.4%
Ethanol	85	173	335	480	13.2%
Landfill Gas	29	29	29	29	0.2%
LPG	231	240	256	282	1.4%
Gasoline	3,303	3,313	3,256	3,053	-0.6%
Natural Gas	3,947	3,779	3,733	4,018	0.1%
Nuclear	658	658	658	658	0.0%
Oil, Unspecified	695	688	692	714	0.2%
Other	2,902	2,949	3,092	3,349	1.0%
Total	**15,178**	**15,161**	**15,422**	**16,086**	**0.4%**

Total Energy Use *(TBtu/year)*	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Residential	1,638	1,772	1,938	2,119	1.9%
Commercial	1,357	1,388	1,425	1,521	0.8%
Energy Intensive Industry	2,508	2,383	2,324	2,332	-0.5%
Other Industry	1,015	1,033	1,064	1,107	0.6%
Agriculture	140	127	114	104	-2.1%
Passenger Transportation	3,998	4,131	4,252	4,201	0.4%
Freight Transportation	1,219	1,183	1,208	1,251	0.2%
Waste & Wastewater	-	-	-	-	#N/A
Power Sector	3,302	3,143	3,097	3,450	0.3%
Total	**15,178**	**15,161**	**15,422**	**16,086**	**0.4%**

Table B-7: Reference Case Electric Sector Results: Eight WCI Partners

Generation Capacity *(MW)*	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Gas/Oil	62,973	72,139	78,999	88,519	2.5%
Coal	14,972	15,372	15,372	15,372	0.2%
Nuclear	9,330	9,330	9,330	9,330	0.0%
Hydro	61,721	63,374	63,428	63,508	0.2%
Landfill Gas/EFW	338	347	347	347	0.2%
Wind	4,083	6,827	18,575	24,513	13.7%
Other	4,358	4,537	5,572	6,582	3.0%
Total	**157,776**	**171,925**	**191,623**	**208,172**	**2.0%**
Generation Output *(GWh/year)*	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Gas/Oil	143,907	130,579	128,042	164,782	1.0%
Coal	99,280	100,482	98,019	101,454	0.2%
Nuclear	65,072	65,072	65,072	65,072	0.0%
Hydro	256,243	267,713	268,095	268,661	0.3%
Landfill Gas/EFW	2,036	2,088	2,088	2,088	0.2%
Wind	8,733	16,245	48,811	65,273	15.5%
Other	23,554	24,607	30,770	36,219	3.1%
Total	**598,824**	**606,784**	**640,897**	**703,548**	**1.2%**

Sales (GWh/year)	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Residential	202,826	218,623	240,918	267,908	2.0%
Commercial	231,140	234,126	245,573	270,164	1.1%
Industrial	163,747	161,434	167,796	187,146	1.0%
Transportation	4,864	6,728	7,908	8,461	4.0%
Street Lights/Misc.	16,447	16,447	16,447	16,447	0.0%
Resale	-	-	-	-	#N/A
Total Sales	**619,023**	**637,357**	**678,642**	**750,126**	**1.4%**

Table B-8: Reference Case Transportation Sector Results: Eight WCI Partners

Distance Travelled (millions of vehicle miles travelled)					
	2006	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Passenger	556,055	589,783	635,948	678,750	1.4%
Freight	72,562	73,248	77,423	82,189	0.9%
Passenger: Miles/person	8,755	8,781	8,847	8,844	0.1%
Vehicle Efficiency (miles/gallon)					
	2006	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Light Gas Vehicles	23.2	24.1	25.5	28.5	1.5%
Medium Gas Vehicles	23.2	24.1	25.5	28.4	1.5%
Heavy Gas Vehicles	16.9	17.3	18.5	20.4	1.4%
Heavy Diesel Vehicles	16.9	17.3	18.4	20.3	1.3%
Vehicle efficiency represents a fleet-wide average, not the average for new vehicles.					

Table B-9: Reference Case Fuel Prices: Eight WCI Partners

Prices (2007 $/mmBtu)	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Residential					
Res Electricity Prices	29.4	30.9	29.8	30.1	0.2%
Res Natural Gas Prices	11.5	13.5	13.9	14.5	1.7%
Res Oil Prices	21.0	23.3	24.0	25.5	1.4%
Res LPG Prices	22.7	24.2	21.7	21.6	-0.3%
Commercial					
Com Electricity Prices	26.4	27.8	26.7	27.3	0.2%
Com Natural Gas Prices	8.8	10.0	9.8	10.1	1.0%
Com Oil Prices	23.1	25.0	24.0	24.6	0.4%
Com LPG Prices	22.5	24.3	21.7	21.4	-0.4%
Industrial					
Ind Electricity Prices	16.3	17.1	15.5	15.4	-0.4%
Ind Natural Gas Prices	6.7	7.3	6.4	6.3	-0.5%
Ind Coal Prices	2.2	2.2	2.1	2.1	-0.1%
Ind Oil Prices	16.4	18.4	19.2	20.7	1.7%
Ind LPG Prices	23.9	25.5	23.1	23.1	-0.2%
Transportation					
Gasoline Prices	21.9	24.1	26.0	28.0	1.8%
Diesel Prices	21.8	24.0	25.8	27.7	1.7%

Table B-10: Reference Case Fuel Expenditures: Eight WCI Partners

Annual Fuel Expenditures (Million$/Yr)					
Sector	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Residential	31,763	37,523	40,670	45,609	2.6%
Commercial	28,452	31,306	31,632	35,373	1.6%
Energy Intensive Industry	28,969	31,248	30,889	32,725	0.9%
Other Industry	14,567	16,511	16,988	18,496	1.7%
Passenger Transportation	82,031	93,848	103,830	110,035	2.1%
Freight Transportation	28,315	30,055	32,280	35,567	1.6%
Agriculture	3,140	3,142	2,819	2,848	-0.7%
Total	**217,237**	**243,632**	**259,107**	**280,654**	**1.8%**

Cap-and-Trade Policy Cases

This section presents the results of three Cap-and-Trade Policy Cases:

- Broad Scope, with complementary policies and without offsets
- Broad Scope, with complementary policies and with offsets
- Narrow Scope, with complementary policies and with offsets

The narrow scope includes of the following:

- Electricity generation, including emissions from electricity imported into WCI jurisdictions from non-WCI jurisdictions
- Combustion at industrial and commercial facilities
- Industrial process emission sources, including oil and gas process emissions

The broad scope includes the emissions in the narrow scope plus the following:[10]

- Residential, commercial, and industrial fuel combustion at facilities with emissions below the WCI thresholds
- Transportation fuel combustion from gasoline and diesel

The banking of allowances is included in all three Policy Cases to simulate how allowances issued or auctioned in one year may be used in a later period. When allowance prices are low, allowances would likely be saved for use in a later year – which is referred to as being banked. When prices are high, allowances would be used from previous year, which is referred to as withdrawn from the bank. Attachment 1 explains how the model simulates banking and withdrawing of allowances.

Offsets are limited to 5% of the compliance obligation. The supply of offsets is modeled using an S-shaped curve that defines the portion of the offset limit that would be used as a function of allowance price. The analyses presented here limit the use of offsets to 5% of the annual compliance obligation, with an expected price of $20 per MTCO2e. Figure B-1 shows how the model simulates the use of offsets. At an allowance price of $20 per MTCO2e, approximately 58% of the offset limit is estimated to be used.

The Offsets Subcommittee is defining a process to develop offset supply curve data reflecting the availability and price of offsets under various offset policy assumptions. When available, those data would enable a more precise assessment to be conducted of the implications of policies that include offsets as a design feature.

The complementary policies have a substantial impact on the estimated emissions and costs. This analysis incorporates three broad sets of policies across all eight WCI partner jurisdictions in the analysis:

- Clean Car Standards, equivalent to California's Pavley I and II. These standards reduce emissions by about 30 MMTCO2E in 2020 compared to the Reference Case.

[10] For purposes of modeling the broad scope of the cap-and-trade program, the eight WCI partner jurisdictions included in the analysis are modeled with the broad scope starting in 2012. Note that British Columbia plans to use its carbon tax as an alternative policy for covering transportation fuels and residential/commercial fuels. This modeling effort, however, treats British Columbia the same as the other seven WCI partner jurisdictions included in the analysis.

- Programs that reduce total Vehicle Miles Traveled (VMT) by 2% from the forecast reference case by 2020. These programs reduce emissions by about 4 MMTCO2E when considered in addition to the Clean Car Standards.
- Aggressive energy efficiency programs that achieve a 1% reduction in the annual rate of electricity and natural gas demand growth. These programs reduce emissions by about 74 MMTCO2E in 2020 across all sectors.

We recognize that the WCI partner jurisdictions have climate action plans that reflect the specific opportunities and needs of the individual jurisdictions. In particular, they typically include policies that extend beyond the three included in this analysis. Based on the available time and resources for this study, as well as the focus on overall results for the WCI partner jurisdictions as a whole, the analysis is limited to reflecting these broad policies at this time.

By themselves the three complementary policies included in the analysis accomplish about 108 MMTCO2E of GHG reductions in 2020, which is about half of the reductions required from the Reference Case estimates in this analysis. Table B-11 shows the estimates for the transportation policies.

The complementary policies are modeled in conjunction with the cap-and-trade policies under the expectation that the cap-and-trade program can provide resources needed for supporting the VMT programs and the energy efficiency programs. In particular, the value of emission allowances (whether auctioned or provided for free) can be directed to support these programs.

Figure B-1: Assumed Offset Supply Curve

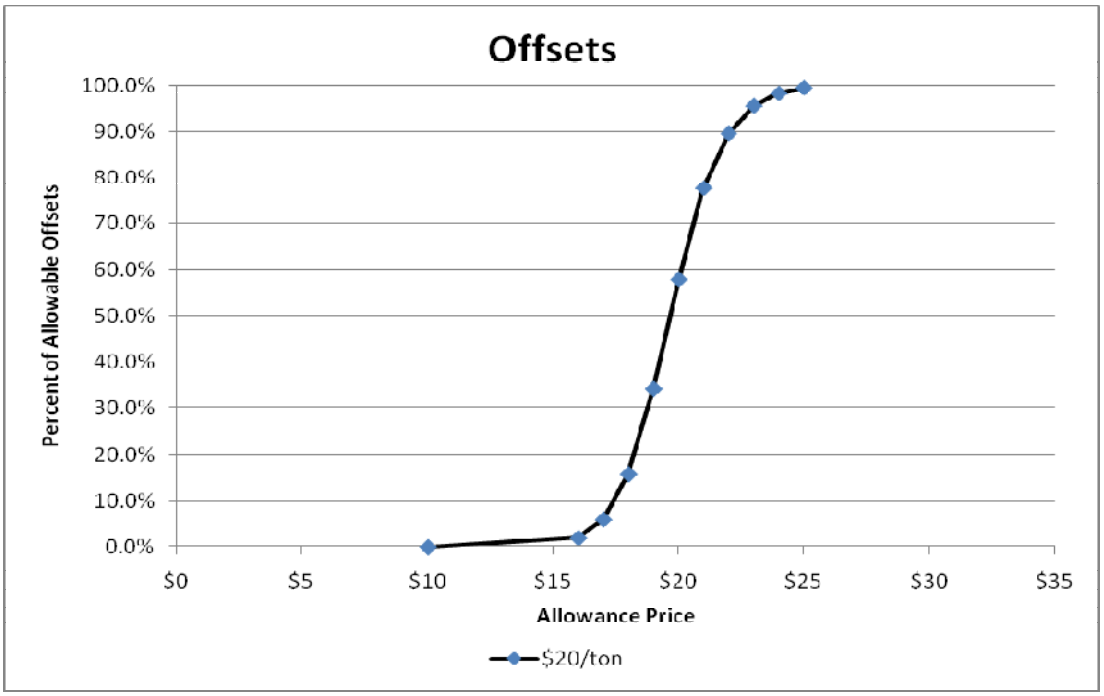


Table B-11: Impact of Transportation Complementary Policies in 2020 Compared to the Reference Case: Eight WCI Partners

	Clean Car Standards	Clean Car Standards and VMT Reduction
Change in GHG Emissions (million tons)	-30.1	-34.2
Change in Annual Vehicle Miles Traveled/Person	112	-65
Change in Annual Fuel Expenditures (million 2007$)	($11,943)	($13,549)
Change in Vehicle Capital Expenditures (million 2007$)	$10,325	($5,549)
Net Cost (Savings) (million 2007$)	($1,618)	($19,098)
Net cost does not include the cost of VMT Reduction programs.		

Table B-12 through Table B-19 show model outputs for these quantities:

- GHG emissions and compliance summary;
- energy use;
- electric sector results;
- transport sector results;
- fuel prices;
- fuel expenditures;
- potential allowance value; and
- costs.

Each table shows results for 2020 for eight WCI Partners, i.e., the seven states and British Columbia. As discussed above, the other three Canadian provinces will be included in future modeling efforts. For each policy case, the three columns indicate the Cap-and-Trade value for the quantity described in the left-most column, the difference between the Cap-and-Trade value and the Reference Case value, and the percentage difference between the two values.

Table B-16 shows fuel prices as a percent difference from Reference Case prices. Table B-19 shows the cost estimates, which only meaningful as incremental differences between the Cap-and-Trade value and the Reference Case value.

Table B-12: Cap-and-Trade Cases Greenhouse Gas Emissions and Compliance Summary: Eight WCI Partners

GHG Emissions in 2020 *(MMTCO2E)*	**Reference Case**	**Broad, Comp Policies No Offsets**			**Broad, Comp Policies With Offsets**			**Narrow, Comp Policies With Offsets**		
		Value	Diff from Reference	Percent Diff	Value	Diff from Reference	Percent Diff	Value	Diff from Reference	Percent Diff
Residential	63.1	55.0	-8.1	-12.8%	55.2	-7.9	-12.5%	55.9	-7.2	-11.4%
Commercial	31.8	26.2	-5.6	-17.5%	26.4	-5.4	-17.1%	27.0	-4.8	-15.0%
Energy Intensive Industry	191.0	174.5	-16.6	-8.7%	175.0	-16.0	-8.4%	172.6	-18.5	-9.7%
Other Industry	31.0	26.9	-4.2	-13.5%	27.0	-4.0	-12.9%	26.3	-4.8	-15.3%
Passenger Transport	294.0	258.7	-35.2	-12.0%	259.0	-34.9	-11.9%	259.9	-34.1	-11.6%
Freight Transport	91.7	89.9	-1.7	-1.9%	90.4	-1.3	-1.4%	91.7	0.0	0.0%
Power Sector	176.9	114.6	-62.2	-35.2%	131.5	-45.3	-25.6%	104.8	-72.1	-40.7%
Waste & Wastewater	38.4	38.4	0.0	0.0%	38.4	0.0	0.0%	38.4	0.0	0.0%
Agriculture (non-energy)	74.9	74.9	0.0	0.0%	74.9	0.0	0.0%	71.1	-3.7	-5.0%
WCI Sub-Total	**992.8**	**859.2**	**-133.6**	**-13.5%**	**877.9**	**-114.9**	**-11.6%**	**847.8**	**-145.0**	**-14.6%**
Non-WCI Power Sector	70.0	70.0			70.0			70.0		
Non-WCI Power Sector Reductions		-45.0			-37.0			-45.0		
Offsets		0.0			-31.8			-18.2		
Bank Flow		-31.1			-31.8			-0.2		
Compliance Total		**853.1**			**847.2**			**854.3**		
Percent of 2006 Emissions		85.2%			84.6%			85.3%		
Bank Inventory		72.6			74.4			0.5		
Allowance Price (2007 $/MT)		**$63**			**$24**			**$71**		
All emissions in millions of metric tons.										

Table B-13: Cap-and-Trade Cases Energy Use: Eight WCI Partners

	Reference Case	Broad, Comp Policies No Offsets			Broad, Comp Policies With Offsets			Narrow, Comp Policies With Offsets		
		Value	Diff from Reference	Percent Diff	Value	Diff from Reference	Percent Diff	Value	Diff from Reference	Percent Diff
Total Energy Use in 2020 *(TBtu/year)*										
Aviation Fuel	725	717.9	(7.4)	-1.0%	720	(5)	-0.7%	725	-	0.0%
Biomass	493	449	(44)	-8.9%	448	(45)	-9.1%	452	(41)	-8.3%
Coal	1,259	758	(502)	-39.8%	1,043	(217)	-17.2%	618	(642)	-50.9%
Diesel	1,025	995	(30)	-2.9%	1,001	(25)	-2.4%	1,014	(11)	-1.1%
Ethanol	480	421	(59)	-12.2%	420	(59)	-12.4%	419	(61)	-12.7%
Landfill Gas	29	29	(0)	0.0%	29	0	0.0%	29	(0)	0.0%
LPG	282	248	(33)	-11.8%	249	(32)	-11.5%	250	(32)	-11.3%
Gasoline	3,053	2,625	(429)	-14.0%	2,628	(426)	-13.9%	2,635	(418)	-13.7%
Natural Gas	4,018	3,245	(774)	-19.3%	3,075	(944)	-23.5%	3,296	(722)	-18.0%
Nuclear	658	658	-	0.0%	658	-	0.0%	658	-	0.0%
Oil, Unspecified	714	686	(27)	-3.8%	688	(26)	-3.6%	687	(27)	-3.8%
Other	3,349	2,956	(393)	-11.7%	2,952	(397)	-11.9%	2,934	(415)	-12.4%
Total	**16,086**	**13,788**	**(2,298)**	**-14.3%**	**13,911**	**(2,176)**	**-13.5%**	**13,718**	**(2,369)**	**-14.7%**
Total Energy Use in 2020 (Tbtu/year)										
Residential	2,119	1,853	(266)	-12.6%	1,856	(264)	-12.5%	1,863	(257)	-12.1%
Commercial	1,521	1,259	(262)	-17.2%	1,260	(261)	-17.2%	1,265	(256)	-16.8%
Energy Intensive Industry	2,332	2,029	(303)	-13.0%	2,035	(297)	-12.7%	2,005	(328)	-14.0%
Other Industry	1,107	1,001	(106)	-9.6%	1,003	(104)	-9.4%	991	(116)	-10.5%
Agriculture	104	93	(11)	-10.2%	94	(10)	-10.1%	92	(12)	-11.4%
Passenger Transportation	4,201	3,698	(503)	-12.0%	3,702	(499)	-11.9%	3,712	(489)	-11.6%
Freight Transportation	1,251	1,229	(22)	-1.8%	1,235	(16)	-1.3%	1,251	-	0.0%
Waste & Wastewater	-	-			-			-		
Power Sector	3,450	2,626	(824)	-23.9%	2,727	(724)	-21.0%	2,539	(912)	-26.4%
Total	**16,086**	**13,788**	**(2,298)**	**-14.3%**	**13,911**	**(2,176)**	**-13.5%**	**13,718**	**(2,369)**	**-14.7%**

Table B-14: Cap-and-Trade Cases Electric Sector Results: Eight WCI Partners

	Reference Case	Broad, Comp Policies No Offsets			Broad, Comp Policies With Offsets			Narrow, Comp Policies With Offsets		
		Value	Diff from Reference	Percent Diff	Value	Diff from Reference	Percent Diff	Value	Diff from Reference	Percent Diff
Generation Capacity in 2020 *(MW)*										
Gas/Oil	88,519	109,759	21,240	24.0%	109,919	21,400	24.2%	109,879	21,360	24.1%
Coal	15,372	15,372	-	0.0%	15,372	-	0.0%	15,372	-	0.0%
Nuclear	9,330	9,330	-	0.0%	9,330	-	0.0%	9,330	-	0.0%
Hydro	63,508	63,471	(37)	-0.1%	63,471	(37)	-0.1%	63,462	(46)	-0.1%
Landfill Gas/EFW	347	347	-	0.0%	347	-	0.0%	347	-	0.0%
Wind	24,513	22,943	(1,570)	-6.4%	22,945	(1,569)	-6.4%	22,721	(1,792)	-7.3%
Other	6,582	6,354	(228)	-3.5%	6,354	(228)	-3.5%	6,344	(238)	-3.6%
Total	**208,172**	**227,576**	**19,405**	**9.3%**	**227,738**	**19,566**	**9.4%**	**227,456**	**19,284**	**9.3%**
Generation Output 2020 *(GWh/year)*										
Gas/Oil	164,782	127,711	(37,072)	-22.5%	101,382	(63,400)	-38.5%	134,044	(30,738)	-18.7%
Coal	101,454	58,979	(42,474)	-41.9%	85,318	(16,136)	-15.9%	46,848	(54,606)	-53.8%
Nuclear	65,072	65,072	-	0.0%	65,072	-	0.0%	65,072	-	0.0%
Hydro	268,661	268,398	(263)	-0.1%	268,398	(263)	-0.1%	268,337	(324)	-0.1%
Landfill Gas/EFW	2,088	2,088	(0)	0.0%	2,088	0	0.0%	2,088	(0)	0.0%
Wind	65,273	60,920	(4,353)	-6.7%	60,925	(4,348)	-6.7%	60,305	(4,968)	-7.6%
Other	36,219	34,579	(1,640)	-4.5%	34,579	(1,640)	-4.5%	34,558	(1,661)	-4.6%
Total	**703,548**	**617,746**	**(85,803)**	**-12.2%**	**617,761**	**(85,788)**	**-12.2%**	**611,251**	**(92,297)**	**-13.1%**
Sales in 2020*(GWh/year)*										
Residential	267,908	232,745	(35,163)	-13.1%	232,447	(35,462)	-13.2%	230,725	(37,183)	-13.9%
Commercial	270,164	223,406	(46,758)	-17.3%	222,998	(47,166)	-17.5%	221,170	(48,994)	-18.1%
Industrial	187,146	162,812	(24,333)	-13.0%	162,071	(25,075)	-13.4%	162,118	(25,027)	-13.4%
Transportation	8,461	8,268	(193)	-2.3%	8,229	(232)	-2.7%	7,923	(538)	-6.4%
Street Lights/Misc.	16,447	16,447	-	0.0%	16,447	-	0.0%	16,447	-	0.0%
Total Sales	**750,126**	**643,678**	**(106,447)**	**-14.2%**	**642,191**	**(107,935)**	**-14.4%**	**638,383**	**(111,743)**	**-14.9%**

Table B-15: Cap-and-Trade Cases Transportation Sector Results: Eight WCI Partners

	Reference Case	Broad, Comp Policies No Offsets			Broad, Comp Policies With Offsets			Narrow, Comp Policies With Offsets		
		Value	Diff from Reference	Percent Diff	Value	Diff from Reference	Percent Diff	Value	Diff from Reference	Percent Diff
Distance Travelled in 2020 *(millions of vehicle miles travelled)*										
Passenger	678,750	672,238	(6,512)	-1.0%	672,665	(6,085)	-0.9%	673,720	(5,031)	-0.7%
Freight	82,189	81,516	(673)	-0.8%	81,715	(474)	-0.6%	82,189	-	0.0%
Passenger: Miles/person	8,844	8,759	(85)	-1.0%	8,765	(79)	-0.9%	8,778	(66)	-0.7%
Vehicle Efficiency in 2020 *(miles/gallon)*										
Light Gas Vehicles	28.5	33	4	15.3%	33	4	15.4%	33	4	15.3%
Medium Gas Vehicles	28.4	33	4	15.3%	33	4	15.3%	33	4	15.3%
Heavy Gas Vehicles	20.4	24	4	17.4%	24	4	17.5%	24	4	17.5%
Heavy Diesel Vehicles	20.3	24	4	17.5%	24	4	17.5%	24	4	17.5%
Vehicle efficiency represents a fleet-wide average, not the average for new vehicles.										

Table B-16: Cap-and-Trade Cases Fuel Price Results: Eight WCI Partners

Prices in 2020 (2007 $/mmBtu)	**Reference Case**	**Broad, Comp Policies No Offsets**	**Broad, Comp Policies With Offsets**	**Narrow, Comp Policies With Offsets**
	Price	Percent Diff	Percent Diff	Percent Diff
Residential				
Res Electricity Prices	30.1	-0.3%	1.0%	12.7%
Res Natural Gas Prices	14.5	31.4%	12.2%	1.0%
Res Oil Prices	25.5	20.4%	7.7%	-0.1%
Res LPG Prices	21.6	14.6%	5.6%	0.0%
Commercial				
Com Electricity Prices	27.3	-2.4%	-0.2%	14.3%
Com Natural Gas Prices	10.1	23.7%	7.9%	-1.0%
Com Oil Prices	24.6	4.9%	2.1%	0.4%
Com LPG Prices	21.4	9.2%	4.4%	1.3%
Industrial				
Ind Electricity Prices	15.4	4.7%	6.6%	35.6%
Ind Natural Gas Prices	6.3	19.2%	7.1%	20.2%
Ind Coal Prices	2.1	167.4%	64.3%	182.4%
Ind Oil Prices	20.7	17.2%	6.5%	19.4%
Ind LPG Prices	23.1	6.2%	2.9%	7.0%
Transportation				
Gasoline Prices	28.0	17.4%	6.6%	0.0%
Diesel Prices	27.7	16.8%	6.4%	0.0%

Table B-17: Cap-and-Trade Cases Fuel Expenditure Results: Eight WCI Partners

Annual Fuel Expenditures in 2020 (M$/Yr)	Reference Case	Broad, Comp Policies No Offsets			Broad, Comp Policies With Offsets			Narrow, Comp Policies With Offsets		
		Value	Diff from Reference	Percent Diff	Value	Diff from Reference	Percent Diff	Value	Diff from Reference	Percent Diff
Sector										
Residential	45,609	39,918	(5,691)	-12.5%	40,244	(5,365)	-11.8%	43,138	(2,471)	-5.4%
Commercial	35,373	28,861	(6,512)	-18.4%	29,356	(6,017)	-17.0%	32,098	(3,275)	-9.3%
Energy Intensive Industry	32,725	29,018	(3,707)	-11.3%	29,119	(3,606)	-11.0%	29,831	(2,894)	-8.8%
Other Industry	18,496	17,001	(1,495)	-8.1%	17,062	(1,434)	-7.8%	17,977	(519)	-2.8%
Passenger Transportation	110,035	96,146	(13,889)	-12.6%	96,251	(13,784)	-12.5%	96,577	(13,458)	-12.2%
Freight Transportation	35,567	34,932	(636)	-1.8%	35,111	(457)	-1.3%	35,568	0	0.0%
Agriculture	2,848	2,482	(366)	-12.8%	2,499	(349)	-12.2%	2,669	(178)	-6.3%
Total	**280,654**	**248,358**	**(32,296)**	**-11.5%**	**249,641**	**(31,012)**	**-11.0%**	**257,859**	**(22,794)**	**-8.1%**

Table B-18: Cap-and-Trade Program Potential Allowance Value: Eight WCI Partners

Allowance Value in 2020 (M$)	Broad, Comp Policies No Offsets	Broad, Comp Policies With Offsets	Narrow, Comp Policies With Offsets
	Diff from Reference	Diff from Reference	Diff from Reference
Sector			
Residential	$3,445	$1,321	$0
Commercial	$1,641	$631	$1,925
Energy Intensive Industry	$10,922	$4,188	$12,293
Other Industry	$1,681	$647	$1,873
Passenger Transportation	$16,197	$6,199	$0
Freight Transportation	$5,630	$2,164	$0
Agriculture	$0	$0	$0
Total	**39,516**	**15,150**	**16,092**
Potential allowance value is calculated as the allowance price times the emissions in the sector. The full allowance value may not be incurred in each sector depending on the manner in which allowances are distributed and the ability to pass allowance costs to customers.			

Table B-19: Cap-and-Trade Cases Cost Results: Eight WCI Partners

Annualized Costs in 2020 (M$/Yr)	Broad, Comp Policies No Offsets	Broad, Comp Policies With Offsets	Narrow, Comp Policies With Offsets
	Diff from Reference	Diff from Reference	Diff from Reference
Sector			
Residential	(6,443)	(6,158)	(3,327)
Commercial	(7,845)	(7,369)	(4,760)
Energy Intensive Industry	10,935	10,908	12,674
Other Industry	1,979	1,996	3,250
Passenger Transportation	(20,988)	(20,511)	(19,005)
Freight Transportation	(722)	(522)	0
Agriculture	(442)	(425)	(254)
Total	**(23,525)**	**(22,080)**	**(11,422)**
These costs do not include costs of VMT Reduction programs, Energy Efficiency programs, nor Potential Allowance Value.			

Sensitivity Cases

This section presents the results of three sensitivity cases. These cases consider alternatives to the energy prices and generation costs assumed in the Reference Case. The cases discussed here are:

- High Energy Prices and High Generation Costs
- Low Energy Price Case
- High Natural Gas Price Case

Other cases are also of interest, but time did not allow for development of input data for them to be modeled in a meaningful way.

For the first two of these sensitivity cases, it was necessary to produce a new Reference Case as well as a policy case. In these cases the policy is compared to its appropriate sensitivity Reference Case.

For all the sensitivity cases, the WCI policy case is for the broad scope with offsets. The sensitivities are variations of the assumptions embedded in the Reference Case, not variations of cap-and-trade policy design.

High Energy Prices and High Generation Costs

The purpose of this sensitivity is to examine the implications of energy prices being higher than assumed in the Reference Case. There has been considerable stakeholder comment that the energy prices in the Reference Case may be too low. Additionally, some stakeholders have commented that the power generation cost assumptions maybe too low, indicating that the recent increases in commodity prices have had an impact on these costs.

This sensitivity includes both increased energy prices and increased power generation costs as a set of conditions that could occur together in the future. The high energy cost case assumes that energy prices start at current 2008 prices and increase in real terms by 50% by 2020, as shown in Table B-20. The high power generation cost case assumes that capital and operation and maintenance (O&M) costs are 30% higher than in the Reference Case.

Table B-20: Fuel Price Forecast:
High Energy Prices and High Generation Costs Sensitivity Case

	2006	2010	2015	2020
World Oil Price (2007 US$/barrel)	64.21	120.37	143.52	166.67
Natural Gas Wellhead Price (2007 US$/mmBtu)	5.97	11.12	13.26	15.40
Coal Prices (2007 US$/ton)	28.98	41.47	48.52	55.90

Low Energy Price Case

The purpose of this sensitivity is to examine the implications of energy prices being lower than assumed in the Reference Case. While there has not been stakeholder comment suggesting that energy prices may be lower, it is prudent to examine the implications of

lower prices. The low energy price case uses the mid-price case from the Annual Energy Outlook 2008 (Table B-21).

Table B-21: Fuel Price Forecast: Low Energy Price Sensitivity Case

	2006	2010	2015	2020
World Oil Price (2007 US$/barrel)	$64.21	$71.60	$57.88	$57.74
Natural Gas Wellhead Price (2007 US$/mmBtu)	$5.97	$7.11	$6.09	$6.25
Coal Prices (2007 US$/ton)	$25.37	$26.66	$23.53	$22.33
Source: EIA Annual Energy Outlook 2008 mid-price series.				

High Natural Gas Price Case

The purpose of this sensitivity is to examine the implications of natural gas prices being higher than assumed in the Reference Case. There has been considerable stakeholder comment that efforts to reduce GHG emissions may increase the demand for natural gas. Consequently, the price of natural gas may increase as a result of the policies that are implemented to reduce emissions.

In the cases examined above, the demand for natural gas declines overall as a result of the complementary policies and the cap-and-trade program. Consequently, the policies examined in this analysis would not be expected to lead to an increase in natural gas prices. Nevertheless, this sensitivity was performed to examined the implications of higher natural gas prices.

To perform this sensitivity, the high natural gas price shown in Table B-20 was used with the cap-and-trade policy. The results were compared to the original Reference Case with the Reference Case natural gas prices. So, the natural gas prices are higher in the cap-and-trade case than in the Reference Case.

Results

Table B-22 through Table B-29 show model outputs for 2020: Each table shows results for eight WCI Partners, i.e., the seven states and British Columbia. The other three provinces will be included in future modeling efforts.

For each policy case, the three columns indicate the relevant Reference Case value (because each policy case has a different Reference Case), Cap-and-Trade value for the quantity described in the left-most column, and the difference between the Cap-and-Trade value and its Reference value.

Table B-26 shows fuel prices as a percent difference from Reference prices. Table B-29 shows the costs, which are only meaningful as incremental differences between the Cap-and-Trade value and the appropriate Reference Case.

Table B-22: Sensitivity Cases Greenhouse Gas Emissions and Compliance Summary: Eight WCI Partners

GHG Emissions in 2020 *(MMTCO2E)*	**Original Reference Case**	**High Energy Prices & Generation Costs**			**Low Energy Prices**			**High Natural Gas Prices**		
		Ref Case	Cap-Trade Case	Diff	Ref Case	Cap-Trade Case	Diff	Ref Case	Cap-Trade Case	Diff
Residential	63.1	58.5	52.2	-6.3	63.9	55.1	-8.7	63.1	51.9	-11.2
Commercial	31.8	28.0	23.9	-4.1	32.1	26.2	-5.9	31.8	23.7	-8.1
Energy Intensive Industry	191.0	182.4	170.0	-12.4	193.4	174.6	-18.8	191.0	174.5	-16.6
Other Industry	31.0	28.0	25.0	-3.0	31.9	27.0	-4.9	31.0	25.7	-5.4
Passenger Transport	294.0	276.0	244.1	-31.9	299.6	262.4	-37.2	294.0	259.1	-34.9
Freight Transport	91.7	79.0	78.5	-0.5	100.2	95.9	-4.3	91.7	90.7	-1.0
Power Sector	176.9	166.5	126.2	-40.3	177.1	102.4	-74.7	176.9	126.6	-50.2
Waste & Wastewater	38.4	38.4	38.4	0.0	38.4	38.4	0.0	38.4	38.4	0.0
Agriculture (non-energy)	74.9	74.9	74.9	0.0	74.9	74.9	0.0	74.9	74.9	0.0
WCI Sub-Total	**992.8**	**931.8**	**833.3**	**-98.6**	**1011.4**	**857.0**	**-154.5**	**992.8**	**865.4**	**-127.4**
Non-WCI Power Sector	70.0	70.0	70.0	-	70.0	70.0	-	70.0	70.0	-
Non-WCI Power Sector Reductions			(42.4)			(45.0)			(45.0)	
Offsets			(12.7)			(34.1)			(26.6)	
Bank Flow			-0.2			-0.1			-11.7	
Compliance Total			**847.9**			**847.8**			**852.1**	
Percent of 2006 Emissions			*84.7%*			*84.6%*			*85.1%*	
Bank Inventory			30.8			0.1			168.4	
Allowance Price (2007 $/MT)			**$18**			**$56**			**$20**	
All emissions in millions of metric tons.										

Table B-23: Sensitivity Cases Energy Use Results: Eight WCI Partners

	Original Reference Case	High Energy Prices & Generation Costs			Low Energy Prices			High Natural Gas Prices		
		Ref Case	Cap-Trade Case	Diff	Ref Case	Cap-Trade Case	Diff	Ref Case	Cap-Trade Case	Diff
Total Energy Use in 2020 (TBtu/year)										
Aviation Fuel	725	680	678	(2)	753	738	(15)	725	721	(4)
Biomass	493	528	469	(59)	495	448	(47)	493	456	(37)
Coal	1,259	1,223	1,055	(168)	1,252	609	(642)	1,259	1,100	(160)
Diesel	1,025	876	861	(15)	1,126	1,067	(59)	1,025	1,004	(21)
Ethanol	480	509	445	(64)	466	412	(55)	480	420	(60)
Landfill Gas	29	29	29	0	29	29	(0)	29	29	(0)
LPG	282	332	285	(47)	271	243	(28)	282	273	(9)
Gasoline	3,053	2,824	2,439	(385)	3,120	2,666	(454)	3,053	2,631	(423)
Natural Gas	4,018	3,478	2,687	(791)	4,065	3,252	(813)	4,018	2,641	(1,378)
Nuclear	658	658	658	-	658	658	-	658	658	-
Oil, Unspecified	714	681	662	(19)	757	714	(43)	714	706	(7)
Other	3,349	3,347	2,987	(360)	3,347	2,943	(404)	3,349	3,017	(332)
Total	**16,086**	**15,164**	**13,255**	**(1,909)**	**16,340**	**13,780**	**(2,560)**	**16,086**	**13,656**	**(2,431)**
Total Energy Use in 2020 (TBtu/year)										
Residential	2,119	2,028	1,802	(226)	2,135	1,854	(281)	2,119	1,803	(316)
Commercial	1,521	1,453	1,231	(222)	1,530	1,261	(269)	1,521	1,233	(288)
Energy Intensive Industry	2,332	2,205	1,963	(242)	2,361	2,029	(332)	2,332	2,004	(328)
Other Industry	1,107	1,050	968	(82)	1,118	1,000	(118)	1,107	976	(131)
Agriculture	104	95	88	(8)	108	95	(13)	104	91	(13)
Passenger Transportation	4,201	3,960	3,500	(460)	4,274	3,745	(530)	4,201	3,699	(502)
Freight Transportation	1,251	1,092	1,085	(6)	1,360	1,305	(55)	1,251	1,238	(13)
Waste & Wastewater	-	-	-	-	-	-	-	-	-	-
Power Sector	3,450	3,281	2,618	(664)	3,454	2,492	(962)	3,450	2,610	(840)
Total	**16,086**	**15,164**	**13,255**	**(1,909)**	**16,340**	**13,780**	**(2,560)**	**16,086**	**13,656**	**(2,431)**

Table B-24: Sensitivity Cases Electric Sector Results: Eight WCI Partners

	Original Reference Case	High Energy Prices & Generation Costs			Low Energy Prices			High Natural Gas Prices		
		Ref Case	Cap-Trade Case	Diff	Ref Case	Cap-Trade Case	Diff	Ref Case	Cap-Trade Case	Diff
Generation Capacity in 2020 *(MW)*										
Gas/Oil	88,519	89,519	106,599	17,080	86,239	108,759	22,520	88,519	136,359	47,840
Coal	15,372	15,372	15,372	-	15,372	15,372	-	15,372	15,372	-
Nuclear	9,330	9,330	9,330	-	9,330	9,330	-	9,330	9,330	-
Hydro	63,508	63,914	63,426	(488)	63,507	63,464	(43)	63,508	63,397	(111)
Landfill Gas/EFW	347	347	347	-	347	347	-	347	347	-
Wind	24,513	22,766	21,533	(1,233)	24,290	22,829	(1,461)	24,513	23,967	(546)
Other	6,582	6,695	6,330	(365)	6,646	6,384	(262)	6,582	6,343	(239)
Total	**208,172**	**207,943**	**222,938**	**14,995**	**205,731**	**226,485**	**20,754**	**208,172**	**255,115**	**46,943**
Generation Output 2020 *(GWh/year)*										
Gas/Oil	164,782	145,539	81,131	(64,407)	162,219	128,052	(34,167)	164,782	84,935	(79,847)
Coal	101,454	101,513	88,202	(13,312)	101,389	46,101	(55,288)	101,454	88,847	(12,606)
Nuclear	65,072	65,072	65,072	-	65,072	65,072	-	65,072	65,072	-
Hydro	268,661	271,519	268,082	(3,437)	268,649	268,349	(300)	268,661	267,877	(784)
Landfill Gas/EFW	2,088	2,088	2,088	0	2,088	2,088	(0)	2,088	2,088	(0)
Wind	65,273	60,428	57,011	(3,417)	64,654	60,603	(4,051)	65,273	63,758	(1,515)
Other	36,219	36,501	34,019	(2,482)	36,886	34,499	(2,387)	36,219	32,919	(3,299)
Total	**703,548**	**682,659**	**595,605**	**(87,055)**	**700,956**	**604,763**	**(96,193)**	**703,548**	**605,496**	**(98,052)**
Sales in 2020*(GWh/year)*										
Residential	267,908	267,531	233,815	(33,717)	267,625	232,186	(35,439)	267,908	235,623	(32,286)
Commercial	270,164	272,103	227,845	(44,257)	268,841	222,860	(45,980)	270,164	228,621	(41,542)
Industrial	187,146	186,028	163,446	(22,582)	185,238	160,256	(24,983)	187,146	164,351	(22,795)
Transportation	8,461	7,533	7,413	(120)	8,537	8,071	(465)	8,461	7,458	(1,003)
Street Lights/Misc.	16,447	16,447	16,447	-	16,447	16,447	-	16,447	16,447	-
Total Sales	**750,126**	**749,642**	**648,966**	**(100,676)**	**746,687**	**639,820**	**(106,867)**	**750,126**	**652,500**	**(97,625)**

Table B-25: Sensitivity Cases Transportation Sector Results: Eight WCI Partners

	Original Reference Case	High Energy Prices & Generation Costs			Low Energy Prices			High Natural Gas Prices		
		Ref Case	Cap-Trade Case	Diff	Ref Case	Cap-Trade Case	Diff	Ref Case	Cap-Trade Case	Diff
Distance Travelled in 2020 *(millions of vehicle miles travelled)*										
Passenger	678,750	663,044	659,404	(3,640)	686,691	677,633	(9,058)	678,750	672,895	(5,855)
Freight	82,189	77,505	77,301	(205)	85,286	83,768	(1,518)	82,189	81,805	(384)
Passenger: Miles/person	8,844	8,639	8,592	(47)	8,948	8,829	(118)	8,844	8,768	(76)
Vehicle Efficiency in 2020 *(miles/gallon)*										
Light Gas Vehicles	28.5	30.2	34.9	4.7	28.4	32.8	4.3	28.5	32.8	4.4
Medium Gas Vehicles	28.4	30.2	34.9	4.7	28.4	32.7	4.3	28.4	32.8	4.4
Heavy Gas Vehicles	20.4	20.6	24.2	3.6	20.5	24.0	3.6	20.4	24.0	3.6
Heavy Diesel Vehicles	20.3	20.4	24.0	3.6	20.3	23.9	3.6	20.3	23.9	3.5
Vehicle efficiency represents a fleet-wide average, not the average for new vehicles.										

Table B-26: Sensitivity Cases Fuel Price Results: Eight WCI Partners

Prices in 2020 (2007 $/mmBtu)	High Energy Prices & Generation Costs		Low Energy Prices		High Natural Gas Prices	
	Ref Price	Percent Diff	Ref Price	Percent Diff	Ref Price	Percent Diff
Residential						
Res Electricity Prices	37.5	-4%	29.0	10%	30.1	12%
Res Natural Gas Prices	22.8	6%	13.4	31%	14.5	68%
Res Oil Prices	40.0	4%	19.9	23%	25.5	6%
Res LPG Prices	21.7	4%	21.6	13%	21.6	5%
Commercial						
Com Electricity Prices	34.8	-4%	26.2	11%	27.3	11%
Com Natural Gas Prices	19.0	4%	9.4	23%	10.1	96%
Com Oil Prices	43.3	1%	22.5	7%	24.6	2%
Com LPG Prices	22.2	3%	21.6	8%	21.4	7%
Industrial						
Ind Electricity Prices	22.9	-2%	14.6	28%	15.4	28%
Ind Natural Gas Prices	16.4	2%	5.9	17%	6.3	169%
Ind Coal Prices	5.1	20%	2.1	148%	2.1	52%
Ind Oil Prices	35.0	3%	15.0	21%	20.7	4%
Ind LPG Prices	23.5	2%	23.2	6%	23.1	4%
Transportation						
Gasoline Prices	40.7	3%	20.7	21%	28.0	6%
Diesel Prices	40.6	3%	20.6	20%	27.7	5%

Table B-27: Sensitivity Cases Fuel Expenditure Results: Eight WCI Partners

Annual Fuel Expenditures in 2020 (M$/Yr)	**Original Reference Case**	**High Energy Prices & Generation Costs**			**Low Energy Prices**			**High Natural Gas Prices**		
		Ref Case	Cap-Trade Case	Diff	Ref Case	Cap-Trade Case	Diff	Ref Case	Cap-Trade Case	Diff
Sector										
Residential	45,609	59,685	51,704	(7,981)	43,546	40,351	(3,195)	45,609	49,857	4,247
Commercial	35,373	46,310	37,665	(8,646)	33,624	29,954	(3,670)	35,373	35,121	(252)
Energy Intensive Industry	32,725	45,447	40,833	(4,614)	28,528	25,567	(2,961)	32,725	34,487	1,762
Other Industry	18,496	26,917	24,680	(2,237)	15,624	14,919	(705)	18,496	19,811	1,315
Passenger Transportation	110,035	153,023	134,505	(18,518)	82,147	71,469	(10,677)	110,035	96,875	(13,160)
Freight Transportation	35,567	45,436	45,174	(262)	29,929	28,755	(1,174)	35,567	35,199	(369)
Agriculture	2,848	3,807	3,328	(478)	2,564	2,349	(216)	2,848	2,779	(69)
Total	**280,654**	380,625	337,889	(42,736)	235,962	213,364	(22,598)	280,654	274,129	(6,525)

Table B-28: Sensitivity Cases Potential Allowance Value: Eight WCI Partners

Allowance Value in 2020 (M$)	High Energy Prices & Generation Costs	Low Energy Prices	High Natural Gas Prices
	Diff from Reference	Diff from Reference	Diff from Reference
Sector			
Residential	$925	$3,064	$1,031
Commercial	$424	$1,456	$471
Energy Intensive Industry	$3,013	$9,705	$3,468
Other Industry	$443	$1,502	$510
Passenger Transportation	$4,325	$14,584	$5,150
Freight Transportation	$1,391	$5,332	$1,802
Agriculture	$0	$0	$0
Total	**10,521**	**35,642**	**12,434**

Potential allowance value is calculated as the allowance price times the emissions in the sector. The full allowance value may not be incurred in each sector depending on the manner in which allowances are distributed and the ability to pass allowance costs to customers.

Table B-29: Sensitivity Cases Cost Results: Eight WCI Partners

Annualized Costs in 2020 (M$/Yr)	High Energy Prices & Generation Costs	Low Energy Prices	High Natural Gas Prices
	Diff from Reference	Diff from Reference	Diff from Reference
Sector			
Residential	($9,724)	($3,749)	$4,833
Commercial	($12,158)	($4,120)	($1,394)
Energy Intensive Industry	$12,294	$11,335	$18,778
Other Industry	$1,917	$2,782	$5,806
Passenger Transportation	($21,999)	($20,845)	($19,589)
Freight Transportation	($298)	($1,362)	($423)
Agriculture	($546)	($287)	($131)
Total	**($30,514)**	**($16,245)**	**$7,880**

These costs do not include costs of VMT Reduction programs, Energy Efficiency programs, nor Potential Allowance Value.

Summary Results

Table B-30 presents summary results for the cases presented above. The GHG emissions are reported for the eight WCI partner jurisdictions included in the analysis. Fuel Expenditures and Total Costs (Savings) are relative to the appropriate Reference Case. The potential value of allowances is shown assuming that the full allowance value is passed through to consumers. Total Costs (Savings) include Fuel Expenditures and annualized investment costs. All emissions are in MMTCO2E and all costs are in 2007 dollars.

Table B-30: Summary Results for 2020: Eight WCI Partners

Case	GHG Emission (MMTCO2E)	Offsets Used (MMTCO2E)	Allowance Price (2007 $)	Change in Fuel Expenditures ($M/Yr)	Potential Allowance Value ($M/Yr)	Total Costs (Savings) ($M/Yr)
Reference Case	992.8	--	--	--	--	--
Cap-and-Trade Policy Cases						
Broad Scope, No Offsets	859.2	--	$63	(32,296)	39,516	(23,525)
Broad Scope, With Offsets	877.9	31.8	$24	(31,012)	15,150	(22,080)
Narrow Scope, With Offsets	847.8	18.2	$71	(22,794)	16,092	(11,422)
Sensitivity Cases						
High Price	833.3	12.7	$18	(42,736)	10,521	($30,514)
Low Price	857.0	34.1	$56	(22,598)	35,642	($16,245)
High Natural Gas Price	865.4	26.6	$20	(6,525)	12,434	$7,880

Fuel Expenditures and Total Costs (Savings) are changes from Reference Case values.
Potential Allowance Value calculated as emissions times allowance price.
Total Costs (Savings) do not include costs of VMT Reduction programs, Energy Efficiency programs, nor Potential Allowance Value.

Attachment 1: Banking

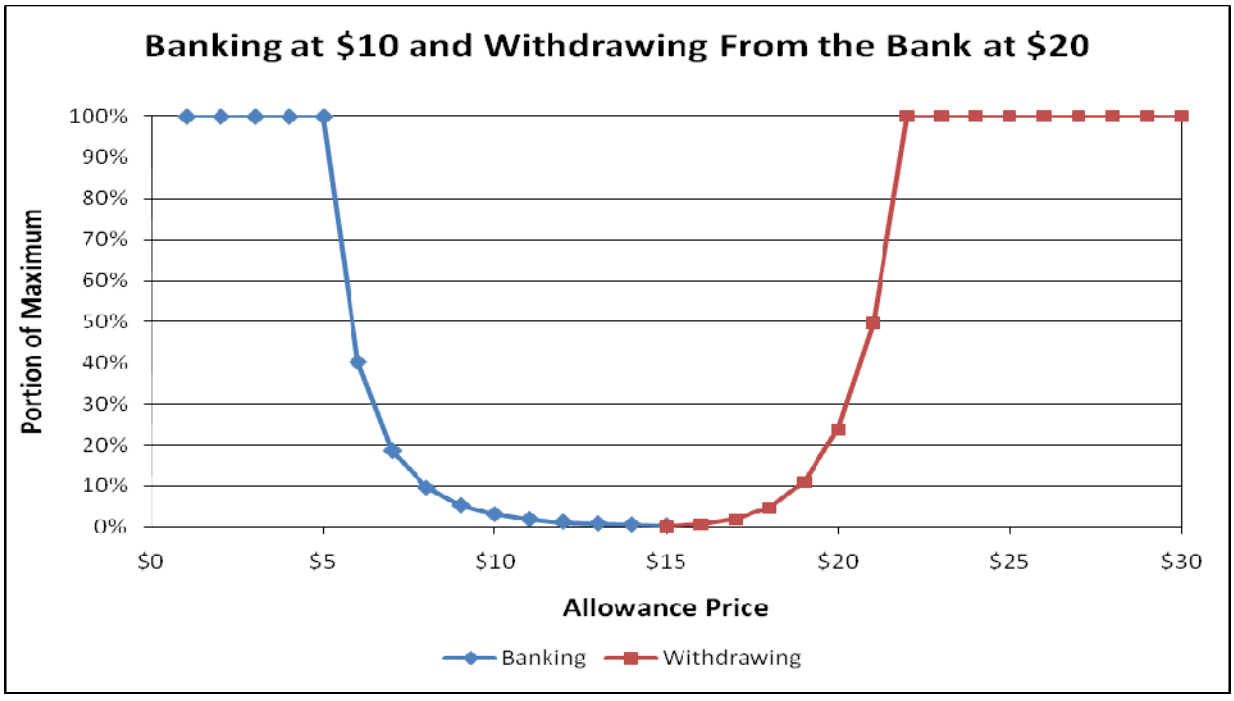
The purpose of banking is to enable allowances issued or auctioned in one year to be used in a later period. When allowance prices are low, allowances would likely be banked. When prices are high, allowances would be withdrawn from the bank. The model does not have the ability to optimize the banking behaviour in the market. Rather, banking is simulated using the following model input parameters:

- The price below which allowances are put into the bank.
- The maximum portion of emission allowances in a given year that can be banked.
- The price above which allowances are withdrawn from the bank.
- The maximum portion of the allowances in the bank in a given year that can be withdrawn.

Figure A-2 shows the banking and withdrawing curves used the cases presented here. The curves shown in the figure set the price below which allowances are banked at $10/ton. The price above which allowances are withdrawn from the bank is set at $20/ton.

The curves in the figure indicate the portion of the allowable banking and redeeming amounts that are simulated to be used. The recommended program design sets no limits on the amounts that can be banked. However, bounds are set in the model to better simulate behavior, particularly in the early years of the program when allowances prices are simulated to be low. The maximum amount put into the bank in a single year is limited to 10% of total allowances available in that year. The maximum amount withdrawn from the bank in a single year is limited to 30% of the allowances in the bank.

Figure B-2: Banking Curves



Attachment 2: Detailed Cap-and-Trade Policy Results

This attachment shows the detailed results for two of the cap-and-trade program model runs:

- Broad Scope, with complementary policies and with offsets; and
- Narrow Scope, with complementary policies and with offsets.

Cap-and-Trade Program: Broad Scope with Complementary Policies and Offsets

Table B-31: Cap-and-Trade Program Greenhouse Gas Emissions and Compliance Summary: Eight WCI Partners Broad Scope with Complementary Policies and Offsets

	2006	2010	2015	2020	Growth Rate 2006-2020
GHG Emissions *(MMTCO2E)*					
Residential	49.7	53.6	54.7	55.2	0.8%
Commercial	29.3	30.4	28.0	26.4	-0.8%
Energy Intensive Industry	176.8	174.0	172.2	175.0	-0.1%
Other Industry	29.8	30.2	28.5	27.0	-0.7%
Passenger Transport	290.8	291.7	276.5	259.0	-0.8%
Freight Transport	93.0	89.6	89.6	90.4	-0.2%
Power Sector	176.6	166.4	133.0	131.5	-2.1%
Waste & Wastewater	25.6	29.1	34.2	38.4	2.9%
Agriculture (non-energy)	59.9	62.1	67.5	74.9	1.6%
WCI Sub-Total	**931.6**	**927.1**	**884.1**	**877.9**	**-0.4%**
Compliance Summary					
Non-WCI Power Sector	70.0	70.0	70.0	70.0	
Non-WCI Power Sector Reductions	-	(0.1)	(20.3)	(37.0)	
Offsets	-	-	-	(31.8)	
Bank Flow	0.0	0.0	21.2	-31.8	
Compliance Total	**1,001.6**	**997.0**	**955.0**	**847.2**	
Percent of 2006 Emissions	*100.0%*	*99.5%*	*95.3%*	*84.6%*	
Bank Inventory	0.0	0.0	107.4	74.4	
Allowance Price (2007 $/MT)	**$0**	**$0**	**$6**	**$24**	
Percentage of Offsets Allowed	5%	5%	5%	5%	
Percent Allowable Offsets Used			**0%**	**100%**	
All emissions in million metric tons.					

Table B-32: Cap-and-Trade Program Energy Use: Eight WCI Partners
Broad Scope with Complementary Policies and Offsets

Total Energy Use *(TBtu/year)*	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Aviation Fuel	609	637	682	720	1.2%
Biomass	443	427	440	448	0.1%
Coal	1,185	1,212	1,063	1,043	-0.9%
Diesel	1,091	1,048	1,021	1,001	-0.6%
Ethanol	85	165	298	420	12.1%
Landfill Gas	29	29	29	29	0.2%
LPG	231	239	242	249	0.5%
Gasoline	3,303	3,219	2,920	2,628	-1.6%
Natural Gas	3,947	3,764	3,217	3,075	-1.8%
Nuclear	658	658	658	658	0.0%
Oil, Unspecified	695	687	679	688	-0.1%
Other	2,902	2,944	2,892	2,952	0.1%
Total	**15,178**	**15,031**	**14,139**	**13,911**	**-0.6%**
Total Energy Use *(TBtu/year)*	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Residential	1,638	1,769	1,813	1,856	0.9%
Commercial	1,357	1,385	1,291	1,260	-0.5%
Energy Intensive Industry	2,508	2,374	2,151	2,035	-1.5%
Other Industry	1,015	1,031	1,011	1,003	-0.1%
Agriculture	140	127	107	94	-2.8%
Passenger Transportation	3,998	4,025	3,870	3,702	-0.5%
Freight Transportation	1,219	1,183	1,204	1,235	0.1%
Waste & Wastewater	-	-	-	-	#N/A
Power Sector	3,302	3,137	2,693	2,727	-1.4%
Total	**15,178**	**15,031**	**14,139**	**13,911**	**-0.6%**

Table B-33: Cap-and-Trade Program Electric Sector Results: Eight WCI Partners Broad Scope with Complementary Policies and Offsets

Generation Capacity *(MW)*	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Gas/Oil	62,973	72,139	96,879	109,919	4.1%
Coal	14,972	15,372	15,372	15,372	0.2%
Nuclear	9,330	9,330	9,330	9,330	0.0%
Hydro	61,721	63,374	63,444	63,471	0.2%
Landfill Gas/EFW	338	347	347	347	0.2%
Wind	4,083	6,827	17,979	22,945	13.1%
Other	4,358	4,537	5,618	6,354	2.7%
Total	**157,776**	**171,925**	**208,969**	**227,738**	**2.7%**
Generation Output *(GWh/year)*	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Gas/Oil	143,907	130,007	97,216	101,382	-2.5%
Coal	99,280	100,365	86,458	85,318	-1.1%
Nuclear	65,072	65,072	65,072	65,072	0.0%
Hydro	256,243	267,713	268,207	268,398	0.3%
Landfill Gas/EFW	2,036	2,088	2,088	2,088	0.2%
Wind	8,733	16,245	47,160	60,925	14.9%
Other	23,554	24,606	30,894	34,579	2.8%
Total	**598,824**	**606,095**	**597,095**	**617,761**	**0.2%**
Sales (GWh/year)	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Residential	202,826	218,393	223,899	232,447	1.0%
Commercial	231,140	233,974	220,827	222,998	-0.3%
Industrial	163,747	161,191	155,272	162,071	-0.1%
Transportation	4,864	6,663	7,729	8,229	3.8%
Street Lights/Misc.	16,447	16,447	16,447	16,447	0.0%
Resale	-	-	-	-	#N/A
Total Sales	**619,023**	**636,669**	**624,174**	**642,191**	**0.3%**

Table B-34: Cap-and-Trade Program Transportation Sector Results: Eight WCI Partners Broad Scope with Complementary Policies and Offsets

Distance Travelled (millions of vehicle miles travelled)					
	2006	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Passenger	556,055	585,955	631,048	672,665	1.4%
Freight	72,562	73,248	77,307	81,715	0.9%
Passenger: Miles/person	8,755	8,724	8,779	8,765	0.0%
Vehicle Efficiency (miles/gallon)					
	2006	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Light Gas Vehicles	23.2	24.6	28.3	32.8	2.5%
Medium Gas Vehicles	23.2	24.6	28.2	32.8	2.5%
Heavy Gas Vehicles	16.9	17.8	20.8	24.0	2.5%
Heavy Diesel Vehicles	16.9	17.8	20.8	23.9	2.5%
Vehicle efficiency represents a fleet-wide average, not the average for new vehicles.					

Table B-35: Cap-and-Trade Program Fuel Prices: Eight WCI Partners Broad Scope with Complementary Policies and Offsets

Prices (2007 $/mmBtu)	**2006**	**2010**	**2015**	**2020**
Residential				
Res Electricity Prices	29.4	30.9	29.7	30.4
Res Natural Gas Prices	11.5	13.5	14.4	16.3
Res Oil Prices	21.0	23.3	24.5	27.5
Res LPG Prices	22.7	24.2	22.0	22.8
Commercial				
Com Electricity Prices	26.4	27.8	26.5	27.2
Com Natural Gas Prices	8.8	10.0	10.0	10.9
Com Oil Prices	23.1	25.0	24.2	25.1
Com LPG Prices	22.5	24.3	22.0	22.3
Industrial				
Ind Electricity Prices	16.3	17.1	15.6	16.4
Ind Natural Gas Prices	6.7	7.4	6.6	6.7
Ind Coal Prices	2.2	2.2	2.5	3.5
Ind Oil Prices	16.4	18.4	19.6	22.0
Ind LPG Prices	23.9	25.5	23.3	23.8
Transportation				
Gasoline Prices	21.9	24.1	26.5	29.8
Diesel Prices	21.8	24.0	26.3	29.5

Table B-36: Cap-and-Trade Program Fuel Expenditures: Eight WCI Partners Broad Scope with Complementary Policies and Offsets

Annual Fuel Expenditures (M$/Yr)					
Sector	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Residential	31,763	37,464	38,001	40,244	1.7%
Commercial	28,452	31,263	28,475	29,356	0.2%
Energy Intensive Industry	28,969	31,127	28,693	29,119	0.0%
Other Industry	14,567	16,483	16,156	17,062	1.1%
Passenger Transportation	82,031	91,324	93,969	96,251	1.1%
Freight Transportation	28,315	30,055	32,173	35,111	1.5%
Agriculture	3,140	3,140	2,625	2,499	-1.6%
Total	**217,237**	**240,856**	**240,093**	**249,641**	**1.0%**

Table B-37: Cap-and-Trade Program Potential Allowance Value: Eight WCI Partners Broad Scope with Complementary Policies and Offsets

Allowance Value (M$)				
Sector	**2006**	**2010**	**2015**	**2020**
Residential	$0	$0	$355	$1,321
Commercial	$0	$0	$182	$631
Energy Intensive Industry	$0	$0	$1,118	$4,188
Other Industry	$0	$0	$185	$647
Passenger Transportation	$0	$0	$1,794	$6,199
Freight Transportation	$0	$0	$581	$2,164
Agriculture	$0	$0	$0	$0
Total	**$0**	**$0**	**$4,215**	**$15,150**

Potential allowance value is calculated as the allowance price times the emissions in the sector. The full allowance value may not be incurred in each sector depending on the manner in which allowances are distributed and the ability to pass allowance costs to customers.

Table B-38: Cap-and-Trade Program Annualized Costs (Savings): Eight WCI Partners Broad Scope with Complementary Policies and Offsets

Annualized Cost (M$/Yr) (Change from Reference Case)				
Sector	**2006**	**2010**	**2015**	**2020**
Residential	$0	$331	($2,279)	($6,158)
Commercial	$0	($37)	($3,632)	($7,369)
Energy Intensive Industry	$0	$1,109	$4,981	$10,908
Other Industry	$0	$258	$858	$1,996
Passenger Transportation	$0	($5,326)	($15,388)	($20,511)
Freight Transportation	$0	($0)	($119)	($522)
Agriculture	$0	($3)	($231)	($425)
Total	**$0**	**($3,668)**	**($15,810)**	**($22,080)**
These costs do not include costs of VMT Reduction programs, Energy Efficiency programs, nor Potential Allowance Value.				

Cap-and-Trade Program: Narrow Scope with Complementary Policies and Offsets

Table B-39: Cap-and-Trade Program Greenhouse Gas Emissions and Compliance Summary: Eight WCI Partners Narrow Scope with Complementary Policies and Offsets

GHG Emissions *(MMTCO2E)*	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Residential	49.7	53.6	54.8	55.9	0.9%
Commercial	29.3	30.4	28.1	27.0	-0.6%
Energy Intensive Industry	176.8	174.0	171.4	172.6	-0.2%
Other Industry	29.8	30.2	28.3	26.3	-0.9%
Passenger Transport	290.8	291.7	276.8	259.9	-0.8%
Freight Transport	93.0	89.6	89.9	91.7	-0.1%
Power Sector	176.6	166.4	132.4	104.8	-3.7%
Waste & Wastewater	25.6	29.1	34.2	38.4	2.9%
Agriculture (non-energy)	59.9	62.1	64.5	71.1	1.2%
WCI Sub-Total	**931.6**	**927.1**	**880.4**	**847.8**	**-0.7%**
Compliance Summary					
Non-WCI Power Sector Reductions	-	-	(21.3)	(45.0)	
Offsets	-	-	(11.7)	(18.2)	
Bank Flow	0.0	0.0	0.0	-0.2	
Compliance Total	**1,001.6**	**997.1**	**917.4**	**854.3**	
Percent of 2006 Emissions	*100.0%*	*99.5%*	*91.6%*	*85.3%*	
Bank Inventory	0.0	0.0	2.7	0.5	
Allowance Price (2007 $/MT)	**$0**	**$0**	**$19**	**$71**	
Percentage of Offsets Allowed	5%	5%	5%	5%	
Percent of Allowable Offsets Used			**57%**	**100%**	

Table B-40: Cap-and-Trade Program Energy Use: Eight WCI Partners Narrow Scope with Complementary Policies and Offsets

Total Energy Use *(TBtu/year)*	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Aviation Fuel	609	637	683	725	1.3%
Biomass	443	427	441	452	0.1%
Coal	1,185	1,212	1,054	618	-4.5%
Diesel	1,091	1,048	1,024	1,014	-0.5%
Ethanol	85	165	298	419	12.1%
Landfill Gas	29	29	29	29	0.2%
LPG	231	239	242	250	0.5%
Gasoline	3,303	3,219	2,923	2,635	-1.6%
Natural Gas	3,947	3,764	3,210	3,296	-1.3%
Nuclear	658	658	658	658	0.0%
Oil, Unspecified	695	687	678	687	-0.1%
Other	2,902	2,944	2,889	2,934	0.1%
Total	**15,178**	**15,031**	**14,129**	**13,718**	**-0.7%**
Total Energy Use *(TBtu/year)*	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Residential	1,638	1,769	1,815	1,863	0.9%
Commercial	1,357	1,385	1,292	1,265	-0.5%
Energy Intensive Industry	2,508	2,374	2,141	2,005	-1.6%
Other Industry	1,015	1,031	1,008	991	-0.2%
Agriculture	140	127	107	92	-2.9%
Passenger Transportation	3,998	4,025	3,873	3,712	-0.5%
Freight Transportation	1,219	1,183	1,208	1,251	0.2%
Waste & Wastewater	-	-	-	-	#N/A
Power Sector	3,302	3,137	2,685	2,539	-1.9%
Total	**15,178**	**15,031**	**14,129**	**13,718**	**-0.7%**

Table B-41: Cap-and-Trade Program Electric Sector Results: Eight WCI Partners Narrow Scope with Complementary Policies and Offsets

Generation Capacity *(MW)*	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Gas/Oil	62,973	72,139	96,879	109,879	4.1%
Coal	14,972	15,372	15,372	15,372	0.2%
Nuclear	9,330	9,330	9,330	9,330	0.0%
Hydro	61,721	63,374	63,444	63,462	0.2%
Landfill Gas/EFW	338	347	347	347	0.2%
Wind	4,083	6,827	17,979	22,721	13.0%
Other	4,358	4,537	5,618	6,344	2.7%
Total	**157,776**	**171,925**	**208,969**	**227,456**	**2.6%**
Generation Output *(GWh/year)*	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Gas/Oil	143,907	130,007	97,031	134,044	-0.5%
Coal	99,280	100,365	86,172	46,848	-5.2%
Nuclear	65,072	65,072	65,072	65,072	0.0%
Hydro	256,243	267,713	268,207	268,337	0.3%
Landfill Gas/EFW	2,036	2,088	2,088	2,088	0.2%
Wind	8,733	16,245	47,160	60,305	14.8%
Other	23,554	24,606	30,926	34,558	2.8%
Total	**598,824**	**606,095**	**596,656**	**611,251**	**0.1%**
Sales (GWh/year)	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Residential	202,826	218,393	223,631	230,725	0.9%
Commercial	231,140	233,974	220,504	221,170	-0.3%
Industrial	163,747	161,191	155,498	162,118	-0.1%
Transportation	4,864	6,663	7,691	7,923	3.5%
Street Lights/Misc.	16,447	16,447	16,447	16,447	0.0%
Resale	-	-	-	-	#N/A
Total Sales	**619,023**	**636,669**	**623,771**	**638,383**	**0.2%**

Table B-42: Cap-and-Trade Program Transportation Sector Results: Eight WCI Partners Narrow Scope with Complementary Policies and Offsets

Distance Travelled *(millions of vehicle miles travelled)*					
	2006	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Passenger	556,055	585,955	631,324	673,720	1.4%
Freight	72,562	73,248	77,423	82,189	0.9%
Passenger: Miles/person	8,755	8,724	8,782	8,778	0.0%
Vehicle Efficiency *(miles/gallon)*					
	2006	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Light Gas Vehicles	23.2	24.6	28.2	32.8	2.5%
Medium Gas Vehicles	23.2	24.6	28.2	32.8	2.5%
Heavy Gas Vehicles	16.9	17.8	20.8	24.0	2.5%
Heavy Diesel Vehicles	16.9	17.8	20.8	23.9	2.5%
Vehicle efficiency represents a fleet-wide average, not the average for new vehicles.					

Table B-43: Cap-and-Trade Program Fuel Prices: Eight WCI Partners Narrow Scope with Complementary Policies and Offsets

Prices (2007 $/mmBtu)	**2006**	**2010**	**2015**	**2020**
Residential				
Res Electricity Prices	29.4	30.9	30.4	33.9
Res Natural Gas Prices	11.5	13.5	14.0	14.6
Res Oil Prices	21.0	23.3	24.0	25.5
Res LPG Prices	22.7	24.2	21.7	21.6
Commercial				
Com Electricity Prices	26.4	27.8	27.2	31.2
Com Natural Gas Prices	8.8	10.0	9.8	10.0
Com Oil Prices	23.1	25.0	24.0	24.7
Com LPG Prices	22.5	24.3	21.8	21.7
Industrial				
Ind Electricity Prices	16.3	17.1	16.3	20.8
Ind Natural Gas Prices	6.7	7.4	6.8	7.5
Ind Coal Prices	2.2	2.2	3.3	6.0
Ind Oil Prices	16.4	18.4	20.3	24.7
Ind LPG Prices	23.9	25.5	23.6	24.7
Transportation				
Gasoline Prices	21.9	24.1	26.0	28.0
Diesel Prices	21.8	24.0	25.8	27.7

Table B-44: Cap-and-Trade Program Fuel Expenditures: Eight WCI Partners Narrow Scope with Complementary Policies and Offsets

Annual Fuel Expenditures (M$/Yr)					
Sector	**2006**	**2010**	**2015**	**2020**	**Growth Rate 2006-2020**
Residential	31,763	37,464	38,520	43,138	2.2%
Commercial	28,452	31,263	28,989	32,098	0.9%
Energy Intensive Industry	28,969	31,127	28,806	29,831	0.2%
Other Industry	14,567	16,483	16,327	17,977	1.5%
Passenger Transportation	82,031	91,324	94,072	96,577	1.2%
Freight Transportation	28,315	30,055	32,280	35,568	1.6%
Agriculture	3,140	3,140	2,661	2,669	-1.2%
Total	217,237	240,856	241,656	257,859	1.2%

Table B-45: Cap-and-Trade Program Potential Allowance Value: Eight WCI Partners Narrow Scope with Complementary Policies and Offsets

Allowance Value (M$)				
Sector	**2006**	**2010**	**2015**	**2020**
Residential	$0	$0	$0	$0
Commercial	$0	$0	$521	$1,925
Energy Intensive Industry	$0	$0	$3,176	$12,293
Other Industry	$0	$0	$524	$1,873
Passenger Transportation	$0	$0	$0	$0
Freight Transportation	$0	$0	$0	$0
Agriculture	$0	$0	$0	$0
Total	**$0**	**$0**	**$4,221**	**16,092**
Potential allowance value is calculated as the allowance price times the emissions in the sector. The full allowance value may not be incurred in each sector depending on the manner in which allowances are distributed and the ability to pass allowance costs to customers.				

Table B-46: Cap-and-Trade Program Annualized Costs (Savings): Eight WCI Partners Narrow Scope with Complementary Policies and Offsets

Annualized Cost (M$/Yr) (Change from Reference Case)				
Sector	**2006**	**2010**	**2015**	**2020**
Residential	$0	$331	($1,771)	($3,327)
Commercial	$0	($37)	($3,144)	($4,760)
Energy Intensive Industry	$0	$1,109	$5,237	$12,674
Other Industry	$0	$258	$1,085	$3,250
Passenger Transportation	$0	($5,326)	($15,073)	($19,005)
Freight Transportation	$0	($0)	$0	$0
Agriculture	$0	($3)	($194)	($254)
Total	**$0**	**($3,668)**	**($13,859)**	**($11,422)**
These costs do not include costs of VMT Reduction programs, Energy Efficiency programs, nor Potential Allowance Value.				

Appendix C: General Q & A

Western Climate Initiative

Q: What is the Western Climate Initiative announcing today?

The Western Climate Initiative (WCI) Partners today announced their proposed design of a regional market-based cap-and-trade program. This program is an important component of a comprehensive regional effort to reduce the pollution that causes global warming to 15 percent below 2005 levels by 2020.

Q: What are the market design elements being released by the WCI?

The WCI partners are recommending a multi-sector cap-and-trade program to reduce the pollution that causes global warming to 15% below 2005 levels by 2020. This program includes the following design parameters:

- A limit on the emissions from all major sources of global warming pollutants;
- Include under the cap all electricity-related emissions, including those associated with electricity imported from outside the WCI partner jurisdictions;
- Ensure that all regulated entities use a consistent reporting methodology; and
- Mitigate economic impacts on consumers and regulated entities by allowing flexibility in how and when the reductions are made (e.g., banking of allowances and the limited use of offsets).

Q: How was the WCI market design developed?

The release of the WCI design recommendations is the culmination of 18 months of extensive analysis, stakeholder consultation and deliberation by the WCI Partners. We will continue to consult with and seek input from the broad range of stakeholders who contributed to this process.

Q: What are the next steps?

The release of this market design program marks the culmination of 18 months of extensive analysis, stakeholder consultation and deliberation by the WCI Partners. This proposal will now be further developed by each WCI Partner with the objective of taking the steps necessary to implement the program.

The timeline agreed to by the WCI Partners is that each will begin reporting emissions in 2011 for emissions that occur in 2010. The first phase of the cap-and-trade program will begin on January 1, 2012, with a three-year compliance period. The second phase will begin in 2015, when the program is expanded to include transportation fuels and residential, commercial and industrial fuels.

Q: What emissions sources are subject to the cap under the WCI agreement?

The WCI cap-and-trade program covers the largest emitters from each state and province, including energy (electricity generation, natural gas and heating fuels), industrial emissions and transportation emissions.

Q: How will emissions allowances be distributed under the WCI agreement?

Each WCI Partner jurisdiction will have an emission allowance budget under the cap-and-trade program that is consistent with its jurisdiction-specific emissions goal for 2020. Each Partner has the flexibility to decide how best to allocate its allowance budget within its jurisdiction.

For instance, a Partner could "give" allowances to the emitters operating within its jurisdiction, "auction" the allowances to willing buyers, or provide for some combination of the two. The WCI design calls for a minimum auction level of 10% at the start of the program, increasing to at least 25% by 2020. Each jurisdiction may auction a higher percentage if it so chooses. In addition, the WCI Partners have agreed to use a portion of the allowance value for purposes with region-wide benefits, such as energy efficiency and low-carbon technology development.

Q: How will compliance be determined under the WCI agreement?

The bedrock of a cap-and-trade system is a rigorous emissions reporting requirement. The regulated sources are required to ensure the data are accurate and complete. Each WCI partner will require third party validation of reported emissions from entities and facilities that will be included under the cap.

The WCI agreement is consistent with previous well-designed cap-and-trade programs that have had compliance rates of over 99 percent. At the end of each compliance period, facilities and entities with emissions are required to submit the same number of emission allowances to the government as the emissions they had during that compliance period. If the facility or entity does not have sufficient emission allowances to cover its emissions, a "penalty" of three allowances will be assessed for each one they are short.

Q: What are offsets? How are they handled under the WCI agreement?

Offsets are reductions in greenhouse gas emissions from outside of the capped sectors, such as forestry and agriculture. Offset credits may be used, provided they meet rigorous criteria to ensure that emission reductions are real, verifiable, surplus/additional, permanent and enforceable. Offset credits may be traded. The WCI program limits the use of offsets for compliance purposes to ensure that a majority of the required emission reductions is achieved in the sources covered by the cap-and-trade program.